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THE EFFECTS OF EXPERIMENTALLY INTRODUCED ANCHORAGES

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THE EFFECTS OF EXPERIMENTALLY INTRODUCED ANCHORAGES UPON JUDGMENTS IN THE AUTOKINETIC SITUATION

CHAPTER I

INTRODUCTION

The purpose of the present study is to investigate some social factors which appear to be important in determining simple judgmental reactions in an unstructured stimulus situation. Specifically it is concerned with the effectiveness of various experimentally introduced anchorages in inducing shifts in judgment as a function of the distance or discrepancy between the established scale of judgment of the subject (S) and the introduced anchorage. Extensive pretest data have indicated the possibility that the effectiveness of the introduced anchorage diminishes with a considerable increase in distance from the scale of judgment established by the S. If the effect can be experimentally demonstrated, it is believed that this study will have definite implications for the psychology of attitude

change, although the present experiment is not a study of attitude change per se.

Conditions in Which Social Factors Influence Judgment

An important issue in studies of the influence of social factors on judgment concerns the conditions under which the spoken judgments of another person or persons modify judgments of a S. Of particular interest has been the role of social pressures or majority opinion in influencing judgments both in highly structured and in ambiguous, ill-defined situations.

Relative Effectiveness of Social Factors in Situations of Varying Stimulus Structure

Several experiments by Coffin (4) are important because they provide evidence that verbal anchorages are more likely to be accepted when the stimulus situation is ambiguous than when the stimulus being judged is relatively well-structured. Coffin was interested in the influence of suggestion upon Ss' responses in situations of varying ambiguity. His experiments on tonal attributes were designed to utilize a situation similar to those commonly employed in experiments on suggestion, and to test "not only whether it

is possible to produce suggestion but whether certain conditions of the stimuli are more conducive to suggestion than are others" (4, p. 85).

Tone was selected as a stimulus whose attributes might be said to vary in ambiguity. Coffin believed that the most frequently recognized attributes of tone are loudness and pitch, and that there exists sufficient agreement as to when a tone is louder or is higher in pitch to enable one to consider these attributes relatively unambiguous. Tone however also has other attributes, such as volume and density. To naive Ss however, these attributes are likely to seem less clear and certain. Coffin noted that observers judging these attributes commonly require "training" to return consistent judgments, which may indicate that they are somewhat more ambiguous as stimuli than are pitch and loudness.

In his experiment Coffin chose one of the unambiguous attributes--pitch, and one of the ambiguous attributes--volume, and designed an experiment to measure changes in judgment of these attributes under the influence of suggestion. In addition to the investigation of pitch and volume, a third attribute was introduced in the experiment. To provide a situation of still greater ambiguity, a quite novel

attribute was "invented." This "new" attribute was arbitrarily defined as varying (with frequency and intensity) in the opposite manner to volume, increasing with pitch and decreasing with loudness. The newly defined attribute was given the impressive name "Orthosonority." Since the Ss could not have heard of "orthosonority," it seemed reasonable, according to Coffin, to suppose that this new attribute represented a more ambiguous, unstructured situation than did either volume or pitch.

Each S was presented with a tonal stimulus for judgment, an "incorrect" suggestion was introduced, and the conformity of his response to the suggestion was measured. The purpose of the experiment was to compare the relative susceptibility to suggestion of judgments on pitch, volume, and "orthosonority."

The S was presented first with a standard tone of a given pitch, volume, and loudness, and then with a second or comparison tone which differed from the standard in some respect. By manipulation of a dial which the S controlled, the second tone could be changed until it seemed to be equal to the standard tone in respect to the attribute being studied in that trial.

Since this was an experiment in suggestion, a few

"stage properties" were employed, with the idea of impressing the Ss with the profoundly scientific character of the whole undertaking. These "properties" the author hoped would "have the effect of endowing the suggestions about to be presented with the revered, slightly mysterious, and indubitably truthful atmosphere of science" (p. 87). The experimental room was well stacked with scientific-appearing devices, all manner of irrelevant electrical apparatus, and brass instruments.

The suggestion was presented in the form of a bakelite faceplate attached to the S's dial, reading, "Increase Pitch (Volume, Orthosonority)" and a prominent arrow indicating the direction in which to turn the dial to follow the suggestion. No further suggestions were given than this silent suggestion of the label and arrow.

With Ss judging pitch (the unambiguous stimulus) it was found that the suggestion was not very effective in shifting their judgments in the "incorrect" or suggested direction. The author points out that Ss failed to comply to any great extent with the suggestion. The results of the experimental and control groups for volume (the ambiguous stimulus) indicate that the control group varied intensity in the "correct" direction while members of the experimental

group were significantly influenced by the "suggestion" on their dial. The author notes that "this result indicates response to the suggestion rather than to the actual requirements of the situation" (p. 98). The results, then, indicate the judgments of the relatively ambiguous attribute tonal volume are more subject to suggestion than are judgments of the more definite attribute pitch.

To carry the extent of ambiguity of stimuli further, the "invented" attribute "orthosonority" was employed. The only description of "orthosonority" given to the Ss was that it "increases with pitch and decreases with intensity" (p. 99). Whereas the attributes volume and pitch were carefully described before the Ss began their judgments, no further description whatsoever was given of "orthosonority." The author noted that "repeated questionings on the part of the Ss revealed that they were quite at a loss as to how to conceptualize the attribute" (p. 99).

The suggestion given to Ss in the "orthosonority" experiment was toward a decrease in intensity. The results indicated that no S departed from the "suggested" direction. Coffin concluded that "it would appear that Ss can be induced to judge a totally unfamiliar attribute of tones and that the direction of their judgments may be influenced by

suggestion in either direction" (p. 101).

The results of Coffin's experiments demonstrate that Ss' judgments are more likely to be influenced by "suggestion" when the stimulus being judged is ambiguous than when it is unambiguous. A series of experiments by Luchins (10) has demonstrated very similar results.

Luchins (10) was interested in determining whether it is possible to obtain extremes of influence, i.e. 100 per cent agreement and 100 per cent disagreement, by slight variations of the same experimental set-up. The material to be judged in these experiments consisted of a series of five drawings, each of which was on a grey card two inches by three inches in size. On each card was a small square from which two lines of unequal length projected in different directions. On every card one of the lines was one inch in length. On card 1 the remaining line was 15/16 of an inch, on card 2 the line was 14/16, and on each of the succeeding cards the line decreased by 2/16 of an inch so that the line was 1/2 of an inch on card 5.

In all experiments the S was given the task of selecting the shorter of two lines on each of the five cards. Prior to judging each pair of lines, the S heard another individual make a selection. The other person was made to

appear like a naive S although actually he was cooperating with the experimenter.

In one experiment the "plant," or experimenter's confederate, made correct choices, i.e. he designated the objectively shorter line as the shorter, and all but a few Ss agreed with his judgments. In another experiment the "plant's" judgments were always incorrect, i.e. the objectively longer line was designated as the shorter, and it was found that the majority of the Ss disagreed with him.

Following these initial experiments, variations were carried out with the object of producing zero and 100 per cent agreement with the "plant" by employing two different methods. One of these methods Luchins refers to as the employment of "external means." In one experiment the employment of "external means" consisted of adding the experimenter's appraisal of "right" to the "plant's" answers, and in another of adding "wrong" to the judgments of the S which disagreed with those of the "plant." In another variation Ss were given special training prior to the experiment to develop what Luchins refers to as "following behavior." And in still another variation, a direct challenge was made to the S to get 100 per cent agreement with the "plant." The other method used to obtain 100 per cent or zero per cent

agreement with the "plant" consisted of providing means for clarifying the evidence presented for judgment, i.e. making the stimulus cards so that the lines were parallel and thus easier to judge, furnishing a means for measuring the lines, and clarifying the possibility of being misled.

The results of these experiments indicate that when the "plant's" judgments were correct, i.e. the objectively shorter line was designated by the "plant" as shorter, 100 per cent agreement was readily achieved. And when the "plant's" judgments were incorrect, zero per cent agreement was obtained. The author was interested, however, in finding out if it was possible to produce 100 per cent agreement with the "plant" when his judgments were in fact incorrect. It was found that large increases in this direction could be obtained under some circumstances, but that 100 per cent agreement was not reached. Luchins observed that "it seemed more difficult to secure agreement when the confederate's choices were false" (10, p. 109). He noted that most Ss appeared to be guided by the lengths of the lines and that it was not easy to overcome this tendency. Luchins concluded that whether or not the Ss were influenced by the "plant's" judgments seemed to depend on the obviousness of the correct answer, i.e. the clarity of the judgment

situation, on the truth or falsity of the "plant's" judgments, and also on the Ss' attitudes to and interpretations of their task and the experimental situation. Additional experiments by Luchins (12, 13, 14) along the same lines have reported similar findings.

In another experiment Luchins (11) varied the material offered for judgment. In this experiment the investigator was interested in the following questions: If after hearing someone else describe a drawing, an individual is asked to examine and describe it, will the previously heard response influence what he sees? Will this influence take the direction of focusing the individual on seeing what the other person described? Will it perhaps cause him to overlook certain prominent structural features of the drawing? Will the influence differ for designs of various degrees of structural clarity?

The author states that "from some of the laws of perceptual organization, we may expect that Ss will tend to view an ambiguous design, which does not dictate an appropriate response, in accordance with what the other person said it contained, that the overheard description will serve as a frame of reference from which to view the unclear situation; but that in a well-structured drawing, the

individual's perception will be determined not by the other's response, but by the characteristics of the design itself" (11, p. 257).

Twelve drawings were used in the experiment and were presented in an order which constituted a series. The series began with a very ambiguous, unclear design out of which the contours of a bottle gradually emerged in successive cards until on the last card there was a complete and clear picture of a bottle.

The series of 12 drawings was presented to a number of children, and their reactions to each drawing were recorded. This constituted a control experiment. Following this the same drawings were presented to a number of pairs of children. One child of each pair, in accordance with previous instructions, always responded first and said, "I see a face." The reaction of this instructed S (the "plant") appeared to exert an influence on the description given by the naive member of each pair. The naive Ss gave more responses of face and fewer responses of "bottle" than had the control group Ss. It was found that the influence was even stronger (i.e. more replies of face, fewer replies of bottle) when the 12 drawings were preceded by an introductory series in which the profile of a face gradually disintegrated,

and the "plant" answered "face" to every drawing both in the preliminary and test series. Luchins observed that the use of the introductory cards alone, without the "plant" appeared to have little or no effect. However, results similar to those obtained by the use of the "plant" were secured by using other introductory cards, certain kinds of previous experience, or altered instructions.

According to Luchins, with the exception of a few Ss, the social influence was not in the nature of a blind reiteration of what the "plant" had reported. The Ss examined the drawings and looked for the object reported by the "plant." When a characteristic of the design compatible with the "plant's" statement was found, it became for some Ss the only aspect of the design to which they paid attention. Luchins concluded that "both external conditions (the nature of the drawing) and internal conditions (attitudes of the Ss) were relevant in bringing about the results" (11, p. 272).

The influence of the "plant" differed for designs of various degrees of structural clarity. In a drawing which contained a clearly structured object, Ss tended to describe this object regardless of what the "plant" said. And even in the more ambiguous and complex drawings, ambiguity or unclearness was no guarantee that the Ss would agree with

the "plant." When a drawing did not readily lend itself to organizations or alterations compatible with the "plant's" reaction, the children usually reacted to some characteristic of the design itself. Thus it would seem that whether or not a S agreed with the "plant" depended to an extent on whether the objective material gave the possibility of support of the "plant's" description.

A similar series of experiments was carried out by Asch (1, 2) with the object of investigating some conditions that influence individuals to remain independent or to yield to group pressures when these are contrary to fact. In this connection, Asch has observed that "current thinking has stressed the power of social conditions to induce psychological changes arbitrarily. It has taken slavish submission to group forces as a general fact and has neglected or implicitly denied the capacities of men for independence, for rising under certain conditions above group passion and prejudice" (2, p. 68). Thus in this series of studies, the interaction between individuals is observed where the most important issue is that of remaining independent or of submitting to social pressure.

In the first experiment of the series, a disagreement was produced between a majority and one individual about a

clear and simple issue of fact. The majority, which was in all cases unanimous, cooperated with the experimenter by reporting wrong judgments, in disagreement with the S who could only judge the facts on the basis of the stimuli presented. The task in this case, required the comparison of the relative length of lines. Ss were required to match a standard line with one of three comparison lines which differed appreciably in length from one another, and one of which was equal to the standard. The unanimous majority matched the standard with a length that differed from it in almost every case.

The results indicated that "the minority estimates remained preponderantly accurate, testifying to the force of the perceived relations under the given conditions" (2, p. 69). Thus although one-third of the Ss' estimates in this study were distorted toward the estimates of the majority, and virtually all of the Ss were disturbed by the majority contradiction of their judgments, two-thirds of the judgments were determined correctly on the basis of the stimuli presented. However, Asch did find individual differences among his Ss with performances ranging from complete acquiescence to complete independence.

Variations of the above experimental conditions were

carried out in which the quality of group opposition and the quality of the task were systematically altered. In one case, the effect of increasing the contradiction between the S and the majority was investigated. In another experiment, the size of the majority was varied. A partner supporting the naive S was introduced in a third variation, and the effects of a naive majority vs. an instructed minority of one were studied in a fourth experiment.

Of particular relevance to the present study was a variation in which it was demonstrated that the results of the first study could be attributed in part to the particular stimulus material used. When differences between the lines did not provide an objective basis for discrimination, the Ss were influenced significantly by the judgments of the "planted" majority without reporting that they felt upset or disturbed. In other words, as the stimulus material became more ambiguous, it was demonstrated that group pressures became more important in the determination of judgment.

The experiments mentioned above as well as one by Thrasher (22) have conclusively demonstrated that social factors play a significantly greater role in determining judgment when the stimulus material is ambiguous and poorly defined than when the stimulus is well-structured and

meaningful. But while individuals may not "slavishly submit" to social pressures when the stimulus being judged is non-ambiguous, the question still remains concerning the limits of influence of these social factors in ambiguous and ill-defined situations. Very little is known about the limits of social influences in highly ambiguous situations or the variables which might define such limits. The possibility exists that even in uncertain and poorly defined situations there are limits to the influence of social factors such as those mentioned in the preceding studies.

Effectiveness of Social Factors in Situations Involving Ambiguous or Unstructured Stimulus Material

One of the first investigations of the influence of social factors on perception and judgment, utilizing ambiguous stimulus material, was carried out by Sherif (17) in 1935. In this experiment Ss serving in the control group made judgments of autokinetic movement in repeated sessions in which they served alone. With these Ss it was found that once a stable individual norm was established in the first session, there was a tendency for the S to maintain the same norm in subsequent sessions. These observations were subsequently confirmed by Walter (25).

In the experimental groups Ss' estimates of movement in the autokinetic situation were compared when they were alone and when two or three Ss were brought together. In one part of this experiment, each S served in an initial session alone and was then introduced into a group session. The purpose of this procedure was to investigate the influence of interaction with other individuals after the S had had the opportunity to form a stable individual norm of judgment in the "alone" situation.

In the second part of the experiment, Ss were introduced to the situation along with other individuals participating for the first time. Following this, each S served alone in the situation. The purpose of the second procedure was to find out whether any standard which might be established jointly with other individuals would continue to determine the S's reaction in the "alone" situation.

The results of the experiment indicated that when two or three Ss served together in the situation, they tended to converge in their judgments and develop a common range and norm. This result was observed regardless of whether the individuals participating were facing the situation for the first time or whether they had served in a previous session alone and had had the opportunity to

develop an individual norm and range of judgment independently. However, as Sherif has pointed out, "this convergence is not so close as that which occurs when the Ss first work together and have less opportunity to set up stable individual norms" (18, p. 171). Apparently when the individual has previously established a norm and range of judgment independently, he is less susceptible to the influence of social factors than when he is facing the situation for the first time.

An experiment by Kelman (8) indicates another factor which may determine the individual's susceptibility to social influences in the autokinetic situation. The experimenter in this case informed some Ss serving alone that their judgments were "correct." When these Ss were later placed in a group situation with other individuals whose judgments differed from their own, there was a marked lack of convergence in their judgments. In some of the Ss there was even a tendency to diverge in the opposite direction under some circumstances.

These experiments by Sherif and Kelman suggest that even in an extremely ambiguous judgment situation there are limits in the extent to which social factors may modify judgment. Although there are no studies which have systematically

investigated the limits of social influences in the autokinetic situation, two experiments in the literature provide valuable leads.

In one investigation, Sperling (21) repeated Sherif's main experiment and confirmed the findings. Ss serving alone quickly established a constant level of judgment and tended to maintain the same norm of judgment in subsequent sessions. Similarly, when two individuals were brought together in the situation, their judgments quickly converged and they adopted the same norm of judgment often fluctuating jointly away from their earlier level. However, when the experimental conditions were varied, the convergence effect was disturbed. With one group of Ss, a "plant" was introduced into the situation, who distributed her judgments between 20 and 25 inches--a range which exceeds the estimates normally obtained under the given experimental conditions. In this case, although eight of the nine Ss shifted significantly in the direction of the "suggested" extent of movement, the amount of convergence was limited. In no case did any of the naive Ss enter the region of judgments presented by the "plant" and in each instance the shift toward the partner was far less than the gap that remained. In short, although the S's judgments in the second session shifted in

the direction of the "plant's" judgments, without exception the S's norm in the second session was more like his norm in the first session than that presented by the "plant."

In the second part of the experiment, Ss were informed during the initial "alone" session that the autokinetic effect was subjective and that the point of light actually did not move at all. Each S was given the opportunity to examine the apparatus and discover for herself that the effect was actually an illusion. Even under such circumstances, Sperling found that when a "plant" was introduced in a later session who set her judgments about five inches higher than the norm of the S, four out of the ten Ss were influenced in the usual fashion. In questioning these Ss it was discovered that they had either forgotten the instructions in the first session or that they did not believe them.

The results of this experiment indicate that even though the judgment situation may be ambiguous, Ss are not necessarily influenced by any social factors introduced into the situation. The fact that in the first part of the experiment convergence was limited as compared with the convergence which occurs between two naive Ss, suggests that the discrepancy between the judgments of the S and "plant" may have been a critical factor. In the second part of the

experiment it should be noted that in some cases, even when Ss are aware that movement is illusory and the discrepancy between their judgments and those of the "plant" is small, they are nevertheless influenced in the direction of the suggested norm.

An experiment by Walter (25) demonstrated that Ss judgments could be influenced in the direction of a "suggested" norm, if that norm was within the range of their previous judgments. In this case Ss in the experimental group served alone in one session during which each established a norm and range of judgment independently. Prior to the second session, the experimenter casually informed each S of judgments attributed to students like himself who were said to be attending one of two schools which the S had previously ranked high in prestige. The introduction of a "suggested" norm resulted in significant shifts in judgment in the direction of the suggestion. In every case however, the norm introduced was at either the 90th or the 10th percentile of the Ss previous judgments.

A third session followed the introduction of a "suggested" norm in the second session and subsequent shifts in the Ss judgments in the direction of that norm. In the third session, another norm was introduced--supposedly the

mean of the judgments in the second school which the S had previously ranked high in prestige. This norm however was at the opposite end of the S's scale from the norm presented in Session II. With the discrepancy between these two norms, Walter observed that frequent norm shifts occurred and that Ss revealed a tendency to return to the region of the original "pre-suggestion" norm. With Ss serving in the control group it was found that if no external factors were introduced from situation to situation, the S's judgments tended to cluster around the same norm in each situation.

The above experiments indicate that in the autokinetic situation Ss are not influenced indiscriminately by social factors introduced, and further, they suggest that the magnitude of influence may depend upon the extent of difference between the norm of the S and the introduced norm. As long as the introduced norm is very close to the range of judgments of the S, or within it (as in Walter's study), convergence is observed and the Ss' judgments move in the direction of the suggested norm. However, when substantial differences exist between the S's norm and the introduced suggestion regarding the extent of movement (as in Sperling's study), the magnitude of influence of these social factors is apparently substantially reduced.

Discrepancies between Anchorages and Judgment Scales in Psychophysical Studies

There is also some evidence from psychophysical studies of judgment which indicates that the distance between the S's stand or position of judgment and the position introduced may be a critical factor in determining the magnitude of influence of the introduced stand. The situation in which a social anchorage is introduced outside of the individual's judgment scale may be akin to that in psychophysical studies when an anchorage located outside the individual's judgment scale is introduced. Anchorages in both of these situations, for example, are external stimuli which differ from the S's judgment scale.

In various psychophysical methods, the S is typically required to make a comparison between some standard stimulus and another stimulus. Thus judgments of "brighter" or "darker" are determined by the relationships between the two stimuli. However, other experiments, using the method of absolute stimuli (24), have demonstrated that judgments of stimuli may still be made when no standard stimulus is present. In this case, after the S has been presented with a series of stimuli for a few rounds, a scale of judgment is established internally. In other words, the judgment of

each succeeding stimulus is made by comparison with the stimuli or judgments which have preceded it.

In an experiment by Wever and Zener (26) Ss were given a "light" series of weights (84, 88, 92, 96, and 100 grams). After Ss had made several judgments with the "light" series of weights, a "heavy" series was introduced (92, 96, 100, and 108 grams). The authors report that the "effect of the first series on the judgments of the second series was quite evident for the first 20 or 25 presentations, i.e. for four or five rounds, judgments of 'heavy' predominated for all the stimuli; from this point on, however, the judgments showed a redistribution conforming to the second stimulus series" (26, pp. 475-476). In other words, when the 96 gram weight is compared or presented with the "light" series of weights, it is judged "heavy," but when it is presented with the "heavy" series, it is judged "light." This experiment demonstrates that the judgment of any particular stimulus is affected by its relationship within a reference scale formed through contact with a series of stimuli.

Other investigators have reported that reference scales typically have one or more outstanding items which have more influence than others in determining judgment, and these outstanding items are referred to as "anchorages" or

"reference points" (15, 23). In psychophysical experiments where a standard stimulus is used, the standard stimulus is usually the outstanding anchorage or referent of judgment. In experiments using the absolute method of judgment, the end points of the reference scale established by the S usually serve as anchorages. Judgments of stimuli, then, are determined by the relationship between these stimuli and the end points or anchorages of the reference scale.

McGarvey (15) and Rogers (16) have demonstrated that when stimuli are introduced at various distances beyond the end of the scale, the whole reference scale of judgment expands in the direction of the anchorage, up to a certain point. However, if the anchorage introduced is removed excessively from the end of the stimulus series, instead of expanding, the whole reference scale of judgment contracts or shrinks, along with the categories within it. If the stimulus introduced is not too distant from the end points of the scale of judgment, it becomes "assimilated" into the scale. On the other hand, when the stimulus introduced is too far beyond the end point of the scale, the "assimilation effect" breaks down and the scale contracts or shrinks. When the anchorage is too distant then from the scale of judgment, a "contrast effect" is produced (20, pp. 65-66).

Cohen (3) demonstrated that the "contrast effect" described above could be produced in judgments using verbal material by introducing anchorages at great distances from the position of items previously judged. Pairs of Ss were asked to agree on ratings of various statements concerning moderately undesirable behavior such as "fishing without a license." When these same statements were presented a second time however, they were mixed in with a series of statements representing extremely undesirable behavior such as "kidnapping a baby for ransom." The extremely undesirable behaviors served as anchorages which were far removed from the statements previously presented. Ratings of the statements in the second session indicated that the moderately undesirable behaviors seemed less serious than when they were judged without the context of extremely undesirable behavior. As Sherif and Sherif have observed in connection with this study, "since the shift in judgments produced by the extreme anchorages was away from the anchorage, the effect of the extreme anchorage was a contrast effect" (20, p. 572). It was further demonstrated that shifts in judgment were not simply a function of repetition of the ratings. Among control Ss who judged the moderately undesirable behaviors in two sessions without the extremely undesirable behaviors,

the ratings tended to remain about the same.

The Present Problem

The problem of this study concerns the effectiveness of experimentally introduced anchorages which differ in varying degrees from the S's previously established judgment scale upon his judgments of autokinetic movement. Previous studies using the autokinetic effect have demonstrated that once an individual has established a norm of judgment, he will ordinarily maintain the same norm in subsequent sessions if the condition is merely one of repetition (8, 19). However, Walter (25) has demonstrated that if, after the S has formed a stable scale of judgment, a suggestion is introduced to the effect that the light moves at either the 10th or the 90th percentile of his previous judgments, a significant shift in the direction of the introduced suggestion or anchorage occurs. On the other hand, Sperling (21) found that if an anchorage is introduced which substantially differs from the S's scale of judgment, the extent of shift in the direction of the anchorage is limited.

On the basis of the experiments presented in the preceding section it seems possible that one critical factor determining the effectiveness of social factors in the

modification of judgments in the autokinetic situation is the distance or discrepancy between the norm of judgment established by the S and the anchorage introduced in the situation. The major hypothesis to be tested in this study is that the S's norm will shift in the direction of an introduced anchorage as an inverse function of the discrepancy between the norm and the introduced anchorage. In other words, with the increased discrepancy between the S's norm and the introduced anchorage, the effectiveness of the anchorage in producing a shift in judgment will be reduced.

Thus while anchorages which differ little from the S's norm would produce significant shifts in judgment, as the distance is increased between the two, eventually a point would be reached where judgments are made by the S as if no anchorage was present. One would suspect that if the anchorage is pushed still further away from the S's scale of judgment, a "contrast effect," similar to those observed in psychophysical experiments might be produced. In this case there might be a likelihood of negative shifts in judgment or "boomerang effects."

The data in this experiment will also provide an opportunity to re-examine the findings of Sherif (17), Walter (25), and others, to the effect that when an individual

serving alone in the autokinetic situation is repeatedly called upon to make judgments, in subsequent sessions he will tend to maintain the same norm.

Hypotheses

1. The S's norm will shift in the direction of an introduced anchorage as an inverse function of the discrepancy between the norm and the introduced anchorage.
   a. Anchorages which are outside of the S's scale of judgment, but which lie immediately adjacent to it will produce significant shifts in judgment.
   b. If the anchorage is sufficiently remote from the S's scale of judgment, his judgments will approximate those made in the first session when no anchorage was present.
   c. As the anchorage introduced becomes increasingly remote from the S's norm, the number of negative shifts or "boomerang effects" may increase.
2. When an individual serving alone in the autokinetic situation is called upon to make repeated judgments, he will tend to maintain the same norm.

CHAPTER II

APPARATUS AND SUBJECTS

Apparatus

Two criteria were used in selecting the room in which the experiment was carried out. First, a large room was necessary because of the procedure to be followed in the experiment. Second, a room was needed which had not previously been used as a classroom since it was highly desirable that none of the Ss be familiar with the dimensions of the room. The room selected had previously been used as a graduate study room, and the dimensions are approximately as follows: length--26 feet, width--24 feet, and height--11½ feet. Windows in the room were blacked out with aluminum foil and black scotch tape, and since no experimental session was carried out before 6:00 P.M., the room was completely dark during each session.

Furnishings in the room consisted of two large tables, three chairs, and a large bookcase. The autokinetic apparatus rested on one of the tables at the approximate eye

level of the Ss. One chair was placed directly behind the apparatus. A second table was placed at the opposite end of the room, and the Ss' relay keys were placed on this table. Two chairs were located behind the table during all experimental sessions. The Ss were seated in a chair located exactly 18 feet from the autokinetic apparatus and directly in front of the apparatus. Upon entering, the S's view of the room was blocked by a large bookcase situated near the door. Each S remained between the bookcase and the door until the door was closed. Lights in the room were out during the entire time Ss were present.

The autokinetic apparatus used in the experiment consists of a device which periodically exposes a dim pinpoint of light through a circular hole one millimeter in diameter by means of a shutter mechanism. The appearance of the light is controlled automatically and regulated so that one minute elapses between the time the light goes out and its reappearance. Five seconds before the light appears, the device presents a warning click and light flash to the experimenter. The light turns on automatically and remains on until either the S or experimenter depresses a relay key attached to the apparatus. Two seconds after one of the relay keys is depressed, the light is turned off automatically.

One relay key adjoins the apparatus itself and is located on the experimenter's table, and two additional keys are located on the S's table at the other end of the room. Also attached to the main apparatus is a timer clock with a luminous second hand which remains in motion as long as the light is on.

A questionnaire which was designed for use in this experiment was administered following each experimental session.[1] On the questionnaire the S was asked to indicate his confidence in his judgments by marking an "X" on a five inch continuum from "VERY SURE" to "NOT SURE AT ALL." In addition each S was asked to indicate the most frequent or average distance the light moved and also to indicate the limits between which the light moved, i.e. smallest distance--largest distance.

Following the second session, those Ss who had served with the "plant," were asked to write answers to the following questions in addition to responding to the questionnaire again: (1) Did you feel that you were influenced by the other individual participating in the experiment? and (2) What do you think was the reason for the difference in your judgments? These two questions were not printed on the

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[1]Sample questionnaires are presented in the appendix.

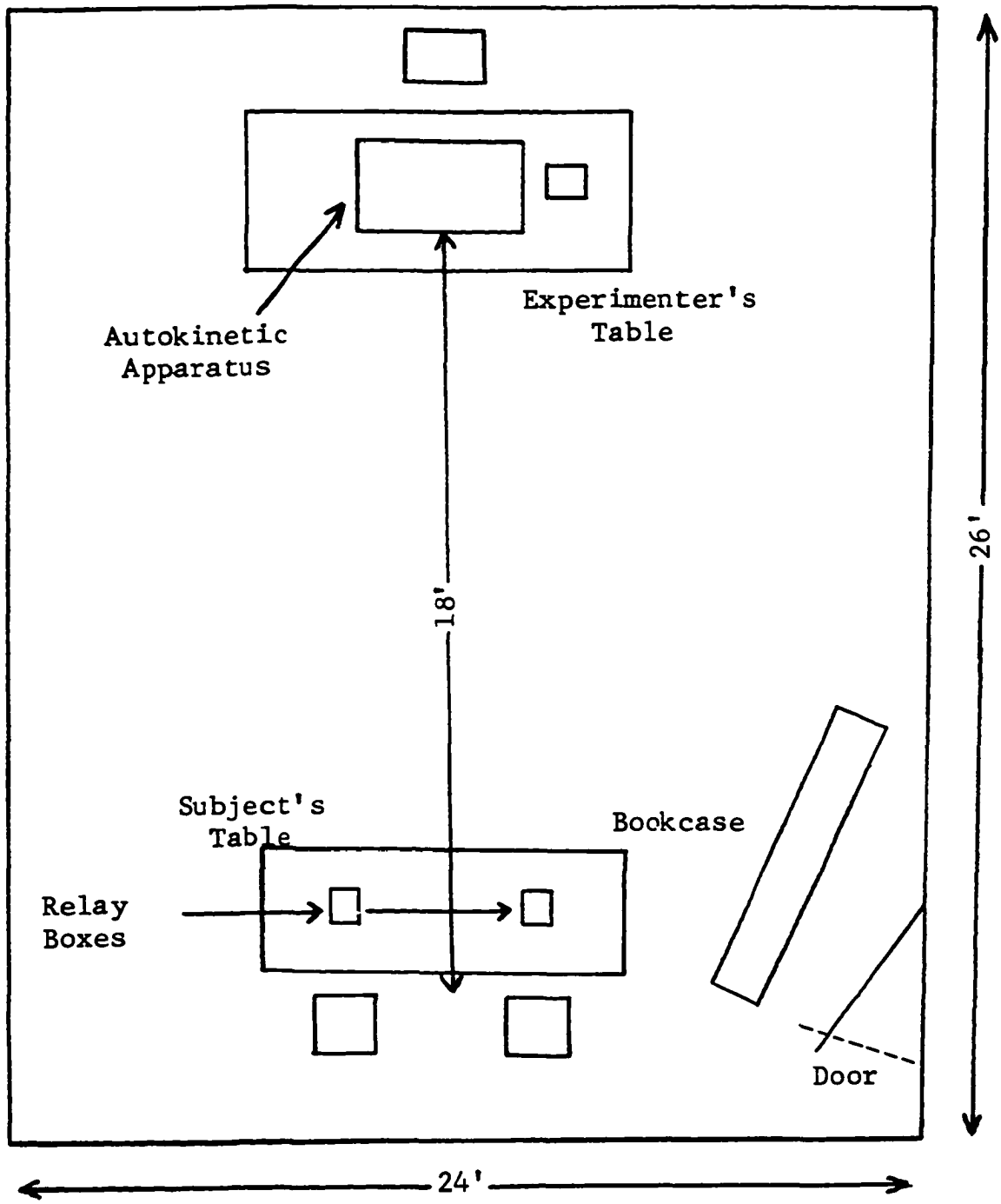

Figure 1. Layout and dimensions of experimental room.

questionnaire itself because the situation was presented to the S in such a way as to appear that the "plant" in the situation was present only because of momentary expediency. To have printed the questions on the questionnaire would have indicated to the S that the situation had been planned beforehand.

Subjects

The 50 Ss used in the experiment were all Caucasian, male, undergraduate students enrolled in classes in psychology at the University of North Dakota. They ranged in age from 18 to 25 years, and represented majors in a variety of departments--Mathematics, Physical Education, Sociology, Physics, etc. Most of the Ss were sophomores, although all classes were represented.

The Ss did not participate in the experiment on a volunteer basis; they were informed that participating in some psychological research was expected of them as part of the requirements of their courses in psychology. By making participation in the experiment compulsory, an effort was made to avoid the biased sample which conceivably results when individuals are asked to volunteer for such a study.

Figure 2. The experimental apparatus and disposition in Session I; subject alone.

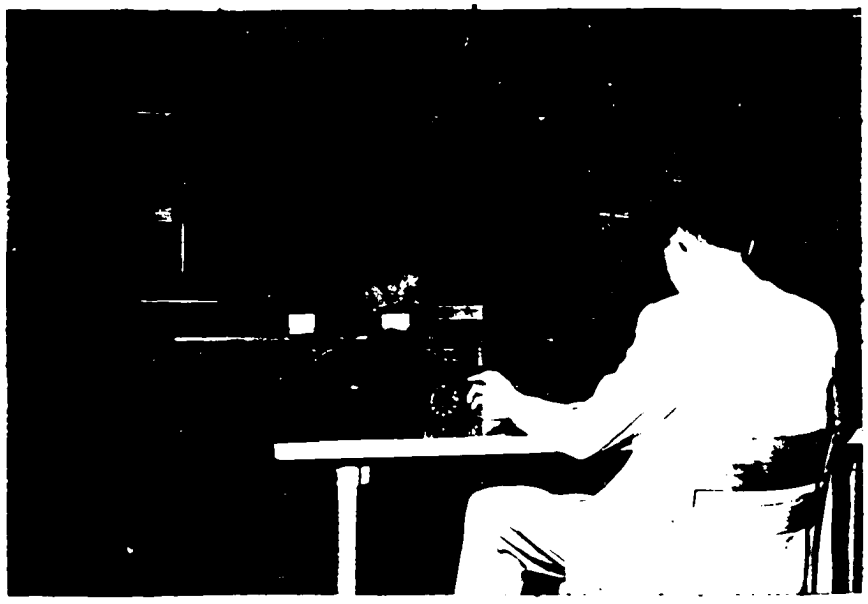

Figure 3. The experimental apparatus and disposition in Session II; both subject and "plant" present.

CHAPTER III

PROCEDURE

Each of the fifty Ss participating in the experiment served in two experimental sessions separated by a time interval of exactly 48 hours. In each case, the S served alone in the first experimental session.

Session I

After the S had reported to the offices of the Department of Psychology, he was taken directly to the experimental room. To prevent him from viewing the layout and dimensions of the room, the S entering the darkened room was asked to remain standing in the vicinity of the door until the door could be closed. Following this, each S was led to the table upon which rested the S's relay keys. He was informed that there were two chairs and that he could sit in either one. In a casual fashion the experimenter then remarked that he might have to begin running two Ss at once to

finish the experiment at a predetermined date. When the S was comfortably seated, he was asked to feel about on the table until he located one of the relay boxes. The S was told that there were two boxes and that he could use either one--the second box being present in the eventuality of running two Ss together. When the S had located the relay box the following instructions were given:

> Periodically you will be shown a point of light. Shortly after the light comes on, it will begin to move. As soon as you see the light move, you are to press the button. Within a few seconds the light will go out. You are then to tell me as accurately as you can, the total distance the light moved during its exposure. Each time, shortly before the light comes on, I shall signal you by saying "READY."
>
> Please try to make your judgments as accurate as you can and you may make your judgments as fine as you deem appropriate.
>
> Any questions?

Following a period of three minutes in which the S could adapt to the darkness, four practice judgments were given. Failure to follow instructions was noted during this period and was corrected. Following the four practice judgments, the experimenter recorded 40 judgments for each S. Each judgment was recorded on a separate sheet of note paper, and when forty judgments had been recorded, the S was taken from the darkened room and asked to fill out the questionnaire previously described.

The S was asked to report back again in 48 hours. The reason given for this instruction was that the entire experiment was too long to carry out all at once since it would involve sitting in the darkened room for almost two hours continuously if done in one session.

Session II

During the second session, the Ss served under five conditions designated as Conditions A, B, C, D, and E, as follows:

> Condition A: Control Group. Ss served alone in a second session under conditions identical with those in the first session.
>
> Condition B: Ss served with a "plant" in the second session who was a complete stranger and who reported movements covering a range of the same size as that used by the S in the first session, but with the median one inch higher than the largest judgment previously given by the S.
>
> Condition C: Ss served in the second session with a "plant" who was a stranger and who reported movements covering a range of the same size as that used by the S in the initial session, but extending upward from a judgment twice as large as the largest judgment previously given by the S.
>
> Condition D: Ss served with a "plant" who reported movements covering a range of the same size as that used by the S in the first session, but extending upward from a judgment eight times as large as the largest judgment previously given by the S.

Condition E: Ss served with a "plant" who reported movements covering a range of the same size as that previously used by the S but extending upward from a judgment twelve times as large as the largest judgment given previously by the S.

In all cases, the range of the "plant's" judgments in the second session was the same as the range of the S's judgments during the initial session. In other words, if the S's judgments were from 2 to 4 inches in the first session, the range of judgments given by the "plant" in the second session would be 2 inches. The size of the "plant's" judgments was determined by the S's judgments during the first session and the particular experimental condition in which the S was serving as indicated above.

The distances between the S's norm and anchorage used in the experimental conditions described above were arrived at during pretesting. It will be noted that anchorages in Conditions B and C are relatively close to the S's norm in each case, while anchorages in Conditions D and E are considerably more remote from the S's norm.

The individual who served as the "plant" in the experiment was a complete stranger to all Ss participating. Since the role of the "plant" in the experiment was a crucial one, considerable time was spent in instructing the "plant" regarding the role he was to play in the experiment. At no

time, however, was the "plant" informed as to the purposes of the experiment or the conditions under which Ss were being run. He was instructed to appear to the S as if he were in the autokinetic situation for the second time as a S. It was emphasized that he was to respond in the situation in much the same manner as the S responded. That is, if the S gave his judgments in a low voice, or barely audible whisper, the "plant" was to make his judgments in the same tone of voice. On the other hand, if the S was to respond in a self-assured fashion in a loud voice, the "plant" was instructed to respond in the same manner. The purpose of this was to prevent the "plant" from influencing the Ss by any means other than through the judgments he was giving.

The "plant" was further instructed that he was not to strike up conversations with the Ss, and if the Ss attempted to converse in the experimental situation, he was to answer politely but not to attempt to maintain conversation. The emphasis throughout was to be on "naturalness" in appearing to the S as simply another naive individual participating in the experiment. The "plant" was given the judgments he was to use with a particular S prior to reporting to the Department of Psychology. In each case, the upper and lower limits of judgment were given, and the mean

was also provided. The "plant" was required to memorize these three numbers and to distribute his judgments throughout the range with about 50 per cent of his judgments at or very near the mean provided. The same individual served as "plant" with all 40 Ss in the experimental groups and was paid at the rate of $1.00 per S.

The second experimental session was held 48 hours following the first session, and arrangements were made so that the S arrived at the office a few minutes before the "plant" arrived. When the S arrived he was informed that another participant had recently telephoned the experimenter to say that he would be unable to keep his appointment. He was further told that this person had expressed a desire to come in later or earlier--depending on the time of evening--and that if it was all right with the S, both of them would be run together to save time. All Ss accepted this explanation and when the "plant" arrived some minutes later, he was introduced to the S, and both were taken to the experimental room together. Every effort was made to avoid arousing suspicion on the part of the S as to the nature of the experiment--even to the point of the experimenter's "forgetting" the "plant's" first name when introducing the two individuals.

When both the "plant" and S were being seated in the experimental room, the comment was casually made that "both of you have been in the experiment before so you know what it consists of." After they had both found chairs and were seated, both "plant" and S were instructed to locate the relay boxes on the table before them.

The procedure in the second experimental session in which the "plant" served with Ss was similar to that in the first session in which the Ss served alone. Different instructions were given, of course, and were as follows:

> Both of you have been in the experiment once before so you know what it is you are to do. However, I will run through the instructions again briefly to refresh your mind. Periodically a small light will come on, and shortly after it comes on it will begin to move. As soon as you see it begin to move, you are to press the button. When the light goes out, you are to tell me as accurately as you can, how far the light moved.
>
> There will be one change this time. In order for you not to influence each other, the same person should not judge first all the time. In other words, you will alternate giving your judgments; one of you will judge first one time, and the other will judge first the next time. Each time the light comes on then, both of you will judge, but you will alternate giving your judgments. In each case the one who judges first will press the button each time.
>
> Any questions? Which one of you will go first? We will dispense with the practice trials this time since you are both familiar with the procedure.

No practice judgments were recorded during the second session because the experimental pretest work indicated that the "plant's" influence was immediate and that the initial three or four judgments were important to the results of the study. In the second session, however, as in the first session, a three minute period preceded the beginning of the experiment, to allow the Ss to become adapted to the darkness.

When forty judgments had been recorded for the S, both S and "plant" were taken from the room and asked to complete the questionnaire. The purpose of the experiment was not revealed to Ss following the completion of their participation, and they were asked not to discuss the experiment with anyone in their classes. They were informed that they would be told of the nature of the experiment in a class period later on in the semester. Discussion with at least half of the Ss following the conclusion of the experiment indicated that at least as far as these Ss were concerned, there had apparently been no discussion of the experiment with other individuals in the classes.

CHAPTER IV

RESULTS AND DISCUSSION

The raw data of this experiment consist of the estimates made by Ss of the apparent distance the light moved. Fifty individuals served as Ss, and each S made a total of forty judgments in each of the two sessions. For the control group there was a total of 800 judgments, and for the four experimental groups there was a total of 3,200 judgments.

Method of Analysis

In line with the statement of the problem and the hypotheses advanced, the treatment of the data was made in terms of comparison of norms of judgment under Conditions A, B, C, D, and E in both sessions.

The analysis of the data was aimed at determining shifts in judgments between sessions under all conditions. Two different methods of determining these shifts were employed. An analysis of covariance of change scores with the

Session I scores partialed out constituted the first method. In the second method, the number of judgments in the second session falling outside the range of judgments in the first session for each S was determined, and comparisons were made between the various experimental conditions.

Since the distributions of judgments for individual Ss were, in many cases markedly skewed, the measure found to be most representative of the central tendency of judgments in each distribution was the median. The medians of each of the distributions of 40 judgments are presented in Table 1. It will be noted that in Session I under each condition Ss served in the situation alone. The mean of the medians in Session I for each condition is presented at the bottom of Table 1, and it will be observed that there is some fluctuation in these means between conditions.

Comparison of Change Scores under Conditions A, B, C, D, and E

Change scores were calculated for each S by subtracting the median in the second session from the median in the first session. If the median in the second session was smaller than the median in the first session, the change score was recorded as negative, while differences in the opposite

TABLE 1

MEDIANS OF JUDGMENT OF INDIVIDUAL SUBJECTS UNDER CONDITIONS A, B, C, D, AND E IN BOTH SESSIONS

Ss	Condition A		Condition B		Condition C		Condition D		Condition E	
	I	II	I	II	I	II	I	II	I	II
1.	1.12	1.25	1.22	2.56	.53	3.00	.91	1.03	.12	.98
2.	1.42	1.05*	1.87	4.00	.72	2.06	.97	3.50	.22	.89
3.	3.83	3.94	3.85	5.04	.89	2.03	2.83	4.27	.52	.77
4.	4.37	3.96*	4.08	6.33	1.20	3.87	8.20	8.50	1.56	2.76
5.	4.41	5.19	4.25	11.50	2.96	3.25	10.87	15.08	1.97	2.83
6.	5.21	4.94*	5.26	7.59	3.58	6.75	11.30	12.32	5.94	6.00
7.	6.14	5.75*	8.25	10.37	3.75	6.25	11.83	10.83*	6.34	6.44
8.	6.27	7.78	9.50	12.75	4.50	13.50	12.08	12.30	10.26	11.56
9.	17.75	12.05*	11.85	24.95	10.75	12.05	15.78	13.83*	11.94	4.00*
10.	29.83	31.83	11.92	17.75	11.60	18.44	17.57	15.16*	14.75	18.62
MEAN	8.04	7.77	6.20	10.28	4.04	7.12	9.23	9.68	5.36	5.48
ADJ. MEAN	8.04	6.29	6.20	10.65	4.04	9.67	9.23	7.00	5.36	6.70

*Indicates median decreased in Session II

direction were recorded as positive. These change scores, which may be referred to as raw change scores, are presented in Table 2. It will be noted that in this table the largest mean raw change score is found under Condition B (+4.08), and that the mean change scores diminish progressively under Conditions C, D, and E (+3.07 - + .44 - + .12 respectively). On the basis of our first hypothesis, to the effect that shift in norms is an inverse function of the discrepancy between the S's norm and anchorage, it would be predicted that the largest mean change score would be found under Condition B and that the smallest change score would be found under Condition E with intermediate scores under Conditions C and D.

For purposes of analysis, all raw change scores were corrected by adding a constant (10.00) to eliminate negative signs. Bartlett's test for homogeneity of variance was applied to the data and yielded a X^2 of 5.07 which is not significant. Analysis of variance of the data was then carried out. $F = 3.64$, $.05 > P > .01$.

Following the analysis of variance, t-tests were applied to comparisons between all the groups. These t-tests indicated that both Conditions B and C were significantly different from Conditions A, D, and E. Conditions B and C were not significantly different, and Conditions D and E

TABLE 2

RAW CHANGE SCORES OF INDIVIDUAL SUBJECTS

Ss	Condition A	Condition B	Condition C	Condition D	Condition E
1.	+ .13	+ 1.34	+2.47	+ .12	+ .86
2.	- .37	+ 2.13	+1.34	+2.53	+ .67
3.	+ .11	+ 1.19	+1.14	+1.44	+ .25
4.	- .41	+ 2.25	+2.67	+ .30	+1.20
5.	+ .78	+ 7.25	+ .29	+4.21	+ .86
6.	- .27	+ 2.33	+3.17	+1.02	+ .06
7.	- .39	+ 2.12	+2.50	-1.00	+ .10
8.	+1.51	+ 3.25	+9.00	+ .22	+1.30
9.	-5.70	+13.10	+1.30	-1.95	-7.94
10.	+2.00	+ 5.83	+6.84	-2.41	+3.87
MEAN	- .26	+ 4.08	+3.07	+ .44	+ .12
ADJ. MEAN	- .28	+ 4.07	+3.09	+ .42	+ .13

Bartlett's Test for homogeneity of variance (9)

$X^2 = 5.0782$
$df = 4$

also did not differ significantly. Condition A did not differ significantly from either Condition D or Condition E.

Since the means in the initial session differed in the five groups, an analysis of covariance was carried out on the data in Table 1 and is presented in Table 3.[1] It will be noted that with the differences in initial means equated, the F of 4.86 is significant at better than the .01 level of confidence.

Following the analysis of covariance, the means for Session II were adjusted, and the mean change scores were also adjusted. The adjusted means for Session II are presented at the bottom of Table 1, and the adjusted mean change scores are presented at the bottom of Table 2 and also in Figure 4. It will be noted that when the means are corrected for differences in Session I scores, the largest mean is again observed under Condition B (10.65), and the size of the means diminishes through Conditions C, D, and E--9.67--

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[1]An additional analysis of covariance was carried out on the medians in Session I for each condition and the corresponding change scores. It is actually a moot point whether this method or the one described above is used. The F-ratio in this case was 37.85/7.97 which yielded an F of 4.72. The appropriate correction was applied to the mean change scores and these became: Condition A -.28; Condition B +4.07; Condition C +3.09; Condition D + .42; Condition E + .13.

TABLE 3

ANALYSIS OF COVARIANCE OF MEDIANS IN BOTH SESSIONS*

Source	df	SSx	SP	SSy	df	Msy	F**
Bet. Gr.	4	585.83	85.70	151.72	4	38.39	4.86
W. Gr.	45	1576.88	1600.36	1974.98	44	7.90	
Total	49	2162.71	1686.06	2126.70			

*Lindquist (8)

**P = <.01

7.00--6.70 respectively. This result is consistent with the first hypothesis. The correction applied to the means in Table 1 indicates that at least the size of the means has been altered slightly. Whether the change in size of means is sufficient to alter the statistical significance of the relationships must be determined through the application of t-tests.

Following the analysis of covariance, t-tests were applied to comparisons between all of the groups using the adjusted means, and these tests are presented in Table 4. The formula for these particular tests is presented in Lindquist (9, p. 327). It will be noted that if the first hypothesis is substantiated, change scores should diminish as the anchorage introduced becomes increasingly remote from

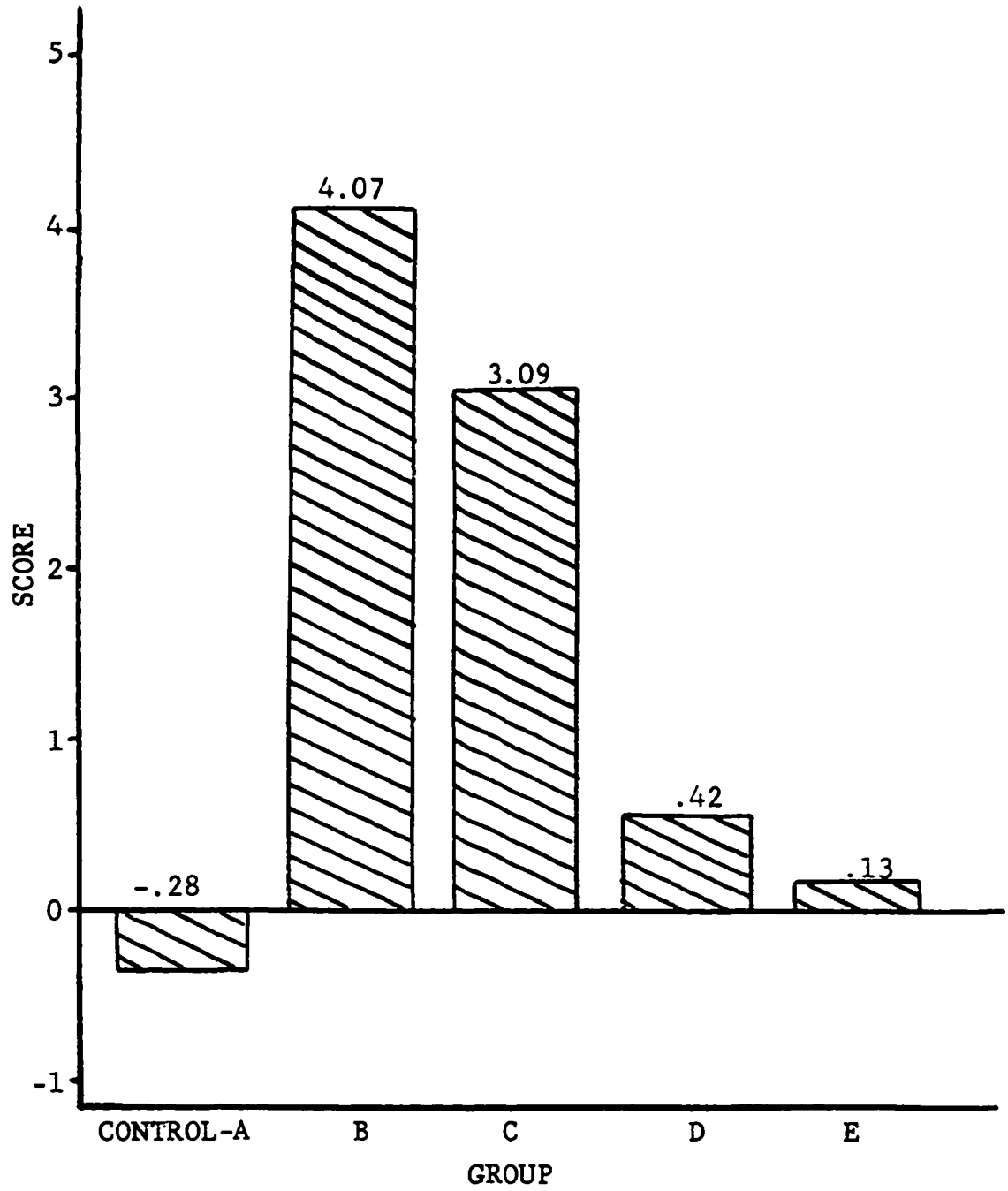

Figure 4. Adjusted mean change scores as a function of subject-"plant" discrepancy in judgment.

Change score equals the difference between mean judgment in Session II and mean judgment in Session I. Adjustment was made following analysis of covariance.

TABLE 4

TESTS OF SIGNIFICANCE FOR PAIRS OF MEANS FOLLOWING ANALYSIS OF COVARIANCE

Groups Compared	t	P
A and B	3.46	<.01
A and C	2.64	<.01
A and D	.54	>.05
A and E	.32	>.05
B and C	.77	>.05
B and D	2.88	<.01
B and E	3.13	<.01
C and D	2.04	<.05
C and E	2.35	<.05
D and E	.19	>.05

the norm established by the S. The crucial comparisons in this case are between Conditions B and D, B and E, C and D, and C and E. Significant differences are noted between B and D and between B and E. The differences between C and D and between C and E were also found to be statistically significant. The tests of the differences between B and C and between D and E were found to be not significant at the .05 level.

It can be seen from the data in Table 4 that controlling the variability among groups in Session I through the

use of analysis of covariance alters the size of the means in Session II somewhat, but not enough to alter the trends of statistical significance. The same comparisons which were significant using the ordinary t-test were significant when variability among groups in Session I was partialed out. And the same comparisons which were not significant when variability in Session I was not partialed out, remain not significant when controls were applied through the use of analysis of covariance. However, by partialing out the variability among groups in Session I, we have achieved a greater degree of precision statistically and can be confident that the relative size of means in Session II reflects the differences in experimental treatments.

The data in Table 4 are consistent with the hypothesis that shift in judgment is an inverse function of the discrepancy between the norm of the S and the introduced anchorage. From this table it can be inferred that anchorages close to the S's norm, i.e. as in Conditions B and C, result in greater shifts in judgment than anchorages which are more remote, i.e. as in Conditions D and E. Although the differences between Conditions B and C and between Conditions D and E were found to be not statistically significant, the direction of the differences is in line with

hypothesis #1. It is important in this study, however, to attempt to account for the lack of significant differences in these two comparisons.

There are two possible explanations for the lack of significant differences between B and C and between D and E. The first, and most obvious possibility, is that there simply is not enough difference in the experimental treatments in these conditions. Thus the anchorage introduced experimentally in Condition B may not be sufficiently different from that introduced in Condition C for a difference to be reflected in the change scores under these conditions. And the same thing may be true of Conditions D and E.

There is, however, an alternative explanation of the lack of a significant difference between B and C. It is possible that measuring change or shift in judgments by obtaining the difference between the median in Session I and the median in Session II may not be completely satisfactory in this case. If the anchorage introduced in Session II is fairly close to the S's norm--as in Condition B--even though the S shifted so completely as to adopt the norm presented by the "plant," his absolute shift in judgment might be less than that which would be expected to occur in the other conditions. A simple example will illustrate this point. If a

S's norm is six inches in Session I and an anchorage is introduced at eight inches, a 100 per cent shift to the anchorage will yield a raw change score of only two inches. On the other hand, a raw change score of two inches under the other conditions could represent only a fraction of the distance between the S's norm and the introduced anchorage. Thus by using raw change scores as an index of judgmental shift, the difference between Conditions B and C is not statistically significant.

The lack of a significant difference between Conditions D and E may also be interpreted in one of two ways. As stated previously, the possibility exists that Conditions D and E are not sufficiently differentiated with respect to the anchorages introduced. An equally plausible explanation, however, is that convergence ceases completely when an anchorage as large as that used in Condition D, or larger, is introduced. In other words, the data suggest that under the experimental conditions of the present study the point where convergence stops is approximately eight times the S's largest judgment. It may be assumed that anchorages larger than this are equally ineffective in bringing about shifts in norms.

Sub-hypothesis 1a is substantiated by the data

presented in Tables 1, 2, 4, and Figure 4. This hypothesis states that anchorages which are outside of the S's scale of judgment, but which lie immediately adjacent to it will produce significant shifts in judgment. Examination of the tables and figure mentioned above indicates that the greatest shift in judgment from Session I to Session II occurred among Ss in Condition B. It will be recalled that in this condition the discrepancy between anchorage and S's norm was smaller than in any of the other conditions, and in each case the anchorage introduced was immediately adjacent to the S's scale of judgment in Session I.

Sub-hypothesis 1b states that if the anchorage is sufficiently remote from the S's scale of judgment, his judgments will approximate those made in the first session when no anchorage was present. It is important to note the comparisons between Conditions A and B, A and C, A and D, and A and E, in this connection. The results in Table 4 indicate that the differences between A and B and A and C are significant at better than the .01 level of confidence. However, the differences between Conditions A and D, and A and E proved to be not significant. The fact that the differences between A and D, and between A and E are not significant warrants the inference that if the anchorage is so remote

from the norm of the S as to appear "unreasonable" to him, his judgments will approximate those made when no anchorage was present.

Relevant to sub-hypothesis 1c concerning the number of negative or "boomerang effects," the data presented in Table 2 indicate that under Conditions B and C, not one S exhibited negative change scores, while in Condition D three Ss and in Condition E one S revealed negative shifts in judgment. It is significant that these negative scores start appearing when the anchorage introduced is eight times the S's maximum judgment. Although the difference between the number of negative change scores found under Conditions D and E is not significant, the data in this table are not inconsistent with the hypothesis that the number of "boomerang effects" increases as the introduced anchorage becomes more remote from the norm of the S. It cannot be said, however, that the data in this study fully substantiate such an hypothesis.

According to the second hypothesis being tested, if an individual serving alone in the autokinetic situation is repeatedly called upon to make judgments, in subsequent sessions he will tend to maintain the same norm. This hypothesis is substantiated by the results presented in Table 2 under

Condition A. It will be noted that changes in judgment which occurred from the first session to the second session under this condition were very slight--a mean change of - .26 inches.

It should be pointed out that there are individual differences among Ss in the extent to which their judgments are modified by the various anchorages introduced. Thus while in general we note that anchorages close to the S's norm are more effective in causing judgmental shifts than anchorages more remote, some Ss in Condition E shifted their judgments more than some Ss in Condition B. This same observation has been made by Asch (1) and others in similar studies. Regardless of whether the stimulus situation is highly-structured and meaningful, or poorly-structured and ambiguous, some individuals appear to be more susceptible to the influence of various social factors than others.

In summary, from the results presented in Tables 1 through 4, it may be inferred that:

1. Anchorages which are relatively close to the S's norm (i.e. Conditions B and C) result in significantly greater shifts in norms than anchorages which are more remote from the S's (i.e. Conditions D and E).

2. When the introduced anchorage is remote from the

S's norm, his judgments will approximate those made when no anchorage was present.

3. There is a possibility that negative shifts will increase as the introduced anchorage becomes more remote from the S's norm, although the data in this study do not fully substantiate such a hypothesis.

4. When Ss serving alone are repeatedly called upon to make judgments, in subsequent sessions they will tend to maintain the same norm or central tendency of judgment.

5. There are individual differences in the extent to which Ss are influenced under all conditions.

Comparisons of the Number of Judgments in Session II Falling outside of the Session I Range under Conditions A, B, C, D, E

Table 5 summarizes the number of judgments in the second session for each S which fall outside the range of judgments established in the initial session. Comparisons were made between conditions using Wilcoxon's test of unpaired replicates. Results of these tests are shown in Table 6.

If no change in judgment occurs from the first to the second session, the S would be expected to distribute

TABLE 5

NUMBER OF JUDGMENTS IN SESSION II FALLING OUTSIDE RANGE OF JUDGMENTS IN SESSION I FOR INDIVIDUAL SUBJECTS

Ss	Condition A	Condition B	Condition C	Condition D	Condition E
1.	0	0	0	0	0
2.	0	0	2	0	0
3.	0	2	3	0	0
4.	0	5	10	0	0
5.	0	6	12	0	0
6.	0	7	15	3	1
7.	0	12	17	4	3
8.	0	21	20	7	4
9.	1	24	26	10	6
10.	2	26	38	15	6
Mean	.30	10.90	14.30	3.90	2.00

$H = 16.01$

$P = < .01$

$df = 4$

TABLE 6

COMPARISON OF NUMBER OF JUDGMENTS IN SESSION II FALLING OUTSIDE SESSION I RANGE FOR INDIVIDUAL SUBJECTS*

Comparisons	Rank Total	P
A and B	67.	$<.01$
A and C	57.5	$<.01$
A and D	81.	$>.05$
A and E	82.5	$>.05$
B and C	98.	$>.05$
B and D	83.5	$>.05$
B and E	77.	$<.05$
C and D	68.	$<.01$
C and E	52.5	$<.01$
D and E	96.	$>.05$

*Wilcoxon's Test--Unpaired Replicates

his judgments over approximately the same range in both sessions. That this is a justified assumption is substantiated by the results obtained from the control group (Condition A) in which the mean change in central tendency from Session I to Session II was very slight. It will be noted that out of ten Ss under Condition A, only two made any judgments in the second session which were outside of the range of judgments for the first session. Of the two Ss who did judge outside of the range, only three of their combined 80 judgments fell outside. On the other hand, examination of the data from Ss under Condition B, indicates that all but two Ss made judgments in the second session which were outside the initial range of judgments. In this case the number of judgments (out of 40 possible) which fell outside of the initial range went as high as 26 for one S. Ss serving under Condition C showed even a greater tendency to judge outside of their initial range in Session II. However, the difference between Conditions B and C in this respect is not significant. It will be recalled that in the experimental conditions, the "plant" in Condition B distributed his judgments over a range which extended downward into the upper part of the S's prior range. Because of this it would be expected that Ss in Condition B would show less tendency to judge outside of

their initial ranges than would Ss in Condition C. Ss serving under Condition D revealed a markedly reduced tendency to judge outside of their initial range as compared with Ss under Conditions B and C, and for Ss under Condition E, this tendency was reduced still further.

The data in Table 5 were analyzed through the use of the Kruskal-Wallis H-test since the distribution of scores under each of the four conditions is markedly skewed. The Kruskal-Wallis test yielded an H of 16.01 which is significant at better than the .01 level of confidence. Tests for the significance of differences were applied to comparisons between Conditions A and B, A and C, A and D, A and E, B and C, B and D, B and E, C and D, C and E, and D and E. Results of these tests are shown in Table 6.

The difference between Conditions A and B was found to be significant at less than the .01 level and reflects the difference in means of .30 for Condition A and 10.90 for Condition B. When an anchorage was introduced which was not substantially different from the norm of the S, the tendency was for the S to distribute his judgments over a different range. However, as the anchorage became more remote from the S's norm, the results indicate the tendency for Ss to either maintain the same range of judgments or to reduce the range.

Comparisons of the data between Conditions A and D, and A and E (not significant at the .05 level) indicate that under these three conditions, Ss' judgments in the second session tend to be distributed within the range of judgments established during the initial session.

The data presented in Table 6 support the findings revealed through the analysis of the change scores and permit the following inferences to be made:

1. When Ss serving alone are repeatedly called upon to make judgments under identical conditions, they will tend to distribute their judgments within the range previously established.

2. As the introduced anchorage becomes increasingly remote from the norm of the S, the tendency of the S to judge outside of his previous range is reduced.

Related Data

After each session Ss were requested to indicate the degree of certainty they felt regarding their judgments by marking an "X" on a five-inch continuum ranging from "VERY SURE" to "NOT SURE AT ALL." Ss serving in the control group and in the two experimental conditions in which the introduced anchorage was considerably remote from their own scale

of judgment tended to become more confident of their judgments in the second session than did Ss in the other two groups.

Ss serving in Conditions D and E indicated that they felt more confident of their judgments in the second session, while Ss serving in Conditions B and C tended to feel less confident. It is interesting to note in this connection, th . reactions of Ss to the experimental situation as expressed by them in informal discussions and in response to the questionnaire following the conclusion of the experiment.

From these discussions with Ss following the experiment, it appears that in each case the S assumed that the issue involved was one of fact and that a correct response was possible. The S also believed that only one response was correct and that both he and the other individual were oriented to and reporting about the same objective situation.

As in Asch's study (2) reported earlier, when the S first found himself in disagreement with the other individual present, there was a tendency toward surprise and increased attention to the task. This appeared to be especially true among Ss where the discrepancy between their judgments and those of the "plant" was great. And there was also a tendency for Ss under these conditions to develop hypotheses to

explain logically the great difference between their judgments and those of the "plant." Unlike Ash's Ss however, these hypotheses did not appear to focus on the S himself as a source of difficulty, but tended to "explain" the discrepancy in terms of the situation or some shortcoming in the other individual. It should be pointed out that in Asch's experiment, Ss participated under conditions where from seven to nine people were unanimously contradicting the Ss' judgments about a well-structured and meaningful situation. In circumstances such as these it was more difficult for the S to "explain" the situation in terms of the other individuals involved, i.e. an erring majority.

Particularly interesting in the present study was the tendency of Ss in Groups D and E to focus their hypotheses concerning the discrepancy on the other individual in the situation, or on the situation itself. A general trend was noted in the types of hypotheses formulated by Ss in different groups. On the whole, "explanations" of the discrepancy in terms of error on the part of the "plant" appeared to be greater in those Ss where the discrepancy between their judgments and those of the "plant" was great. When the discrepancy was slight, the tendency was to explain the difference more in terms of the indefiniteness of the situation, etc.

The most typical of the hypotheses developed by Ss to "explain" the obvious discrepancy between their judgments and those of the "plant" indicated that they believed the "plant" to be overestimating the distance between himself and the light. The following are responses of this type:

> I thought second person thought that the light was a greater distance away.
>
> Difference in estimated distances possibly due to differences in estimated distance from light.
>
> The difference in my answers and the answers the other person gave was due to the misjudgment in the distance the light was away from us.
>
> I felt the difference in answers came from the disagreement about how far away the light was.
>
> The difference in judgment was probably due to the person's idea where the light was situated.

Some Ss formulated hypotheses explaining the situation in terms of the "eyesight differences" between themselves and the "plant." It is interesting that in some of these hypotheses, there was a tendency to attribute the difference in judgments to the "plant's" "poor eyesight":

> The only thing I can think of was the difference in a person's eyesight.
>
> Either eyesight or lack of knowledge of distance.
>
> His poor eyesight might do it. Poor value of distance.
>
> Lack an idea--perhaps eyesight.

A wide variety of other answers concerning differences in "depth perception," "reaction-time," etc., reflects attempts to logically interpret the obvious discrepancy in the situation:

> The reason for the different judgments was that we could have been looking in different places when the light was turned on.
>
> Depth perception, reaction, timing.
>
> I believe the reason for the differences of our answers was that we had different depth perceptions.
>
> Each of us possibly was thinking along different lines as to how the light was being focused.
>
> It may have been because of darkness and the way my eyes are first adjusted when I start seeing the light.
>
> The reason there was such a difference between the distance judged between myself and White, could have possibly been that he (White) was a service man in the Air Force and had come in contact with this principal before.

It will be noted that in some of the statements given above, the S obviously places the responsibility for error on himself. There were of course, individual differences in this respect and even in those conditions where the discrepancy between the "plant's" judgments and those of the S was large, there were some Ss who focused the source of error on themselves.

Eight of the Ss in the experiment indicated that they

had no idea whatsoever which would account for the discrepancy, and several other Ss developed hypotheses which are difficult to interpret:

> I think the difference was due to individual opinion.
>
> It must be a completely mental state. The individual judges it according to various ideas he may have about as to how much the differences in distance may influence size (as he sees it).
>
> The difference between the two of us showed that we thought that the dot moved faster or slower.
>
> I think the speed of the light and how long the light traveled was what I based mine on.
>
> He undoubtedly reacts to light at distances in the dark different than I.
>
> Possibly that darkness seems to give the impression of no time or space.

Among Ss serving in those conditions where the discrepancy between their judgments and those of the "plant" was large, the following reaction to the judgments of the "plant" is typical: "At first I was surprised by the other fellow's judgments, but I couldn't see how I could be that far off so after the first couple of judgments I ignored what he said." This S incidentally indicated greater confidence in his judgments in the second session than he had in the first session.

The question, "What do you think was the reason for

the difference in your judgments?" was included in the questionnaire originally because of the necessity of maintaining a check on the success of the "plant" in carrying out his role. It was felt that if the S suspected the "plant" was actually cooperating with the experimenter, this fact would be revealed in the response to this particular question.

From the response to this question and from discussions with Ss following completion of the entire experiment, it was evident that the "plant" had given a convincing impression of being a "naive" individual in the situation. No S indicated that he suspected the "plant" was cooperating with the experimenter.

Ss in Conditions B, C, D, and E were also asked to indicate on the questionnaire administered following the second session, if they felt they had been influenced by the judgments of the other individual in the situation. Since "being influenced" by someone has rather negative connotations, at least in our culture, there would probably be a reticence on the part of Ss to admit they had been influenced, even if they felt they had. Nevertheless, under Conditions B and C, where Ss had in fact been influenced to a greater extent than under the other two conditions, there did seem to be a tendency for some Ss to be aware of this.

However, out of ten Ss serving under Condition C, seven gave fairly unequivocal "No's" in response to this question. Interestingly enough, one S who shifted about two inches in the direction of the anchorage, when asked, "Were you influenced by the other person," responded that "I was strengthened in my own convictions slightly." All twenty Ss under Conditions D and E gave unequivocal negative responses to this question. One response which gives an idea of the reason for the lack of change under Condition E was as follows: "No, the other person's distances were too far from mine."

In general there appeared to be a greater tendency for Ss serving under Conditions D and E to simply ignore the judgments of the "plant," while Ss serving under Conditions B and C found this more difficult since the judgments given by the "plant" were not substantially different from their own. In spite of this, only a few Ss who had in fact moved in the direction of the "plant" reported that they felt they had been influenced. Even some Ss who stated that the light seemed to be moving further during the second session than it did in the first session indicated they felt they had not been influenced by the "plant's" judgments.

As a check on carelessness on the part of any S becoming a significant factor in determining change from

Session I to Session II, Ss were asked to indicate the average distance the light moved and the limits between which the light moved following Session I. Prior to the experiment it was believed that if a great discrepancy existed between the actual judgments of the S and the indicated judgments, a significant change occurring in Session II might be attributable to carelessness or lack of interest in Session I. However, the results indicate that all Ss in the experiment were able to report the limits within which they had judged and the central tendency of judgments with remarkable accuracy. The same information was obtained from Ss following Session II, and an inspection of this data indicates a slightly greater tendency toward accuracy than in Session I. We would attribute this to the likelihood of greater ego-involvment in the Ss in the second session.

CHAPTER V

IMPLICATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

Implications of the Present Study for Attitude Change

Studies of attitude change have for the most part, been unconcerned with relating the area of attitude change to other areas in psychology. There have been few attempts, for example, to relate attitude change to principles of judgment, perception, motivation, etc. And in pointing out the emerging areas of research in communication and persuasion, Howland, Janis, and Kelley (7, p. 285) emphasize this point when they state that "our experience in the field of persuasion emphasizes the extent to which progress in this area is dependent upon further advances in basic theory in psychology as a whole." They emphasize the necessity of a more intensive study of judgmental phenomena, of research directed toward integrating the fields of perception and

attitude, and of a more substantial basis for understanding the nature of concept formation as it relates to communication and attitude change. These are, they say, "the topics which one feels afterward he should have been concentrating on from the start" (p. 281).

The present experiment is concerned primarily with the study of one type of social influence (i.e. the spoken judgments of a "plant" who is interpersonally neutral to the Ss) in the modification of judgments in an unstructured stimulus situation. But it is believed that the results of this study may shed some light on the judgmental components involved in attitude functioning and change.

Both perception and judgment play a significant role in attitude change. If an attitude is to be modified, the individual must perceive some stimulus relative to that attitude, whether it be a communication read by some psychologist or a decision agreed upon by individuals in a group of which the person happens to be a member. Further, when an individual with a definite attitude is presented with some communication or stimulus relative to that attitude, his perception and judgment of the stimulus and subsequent reaction to it will be determined not only by the stimulus involved but also by his particular attitude. Thus, both the individual's

attitude and the stimulus presented may function as anchorages in determining perception and judgment. In view of this, it seems possible that we may be able to understand the individual's reaction to a particular stimulus or communication in terms of the relationship between these anchorages.

It has been pointed out that "the individual's stand on an issue and the contents of the stimulus material presented do not usually represent single points on a scale" (20, p. 573). Rather it is said, each stand or position represents a portion of the scale which may be more or less clearly defined in different cases. In most cases the individual has what may be termed a "latitude of acceptance" for positions near his own. In general, the more narrow his latitude of acceptance, the less tolerant he is for other positions on the issue and the more intensely he rejects them.

In order to understand an individual's reaction to a particular stimulus or communication then, it would be necessary to be aware of his position or latitude of acceptance, the range of positions presented to him, and the distance between his own position and that presented to him.

On the basis of the hypotheses in the present experiment, and the results of previous studies of judgment, we would predict a greater likelihood of shifts in attitude when

the distance between the position or stand of the individual and the position presented is not great. In other words, the likelihood that a shift in attitude would occur would decrease as the magnitude of the distance between the S's point of view and the stand presented increased.

In terms of the basic principles involved, the present experiment might be considered as roughly analogous to an attitude change situation. The S in the first session forms a relatively stable norm regarding the amount of movement of the light. In the second session, his norm of judgments in the first session serves as an anchorage in the determination of further judgments. However, the spoken judgments of the confederate or "plant" in the situation also function as anchorages in determining judgment. Thus the individual's perception and judgment of movement in the second session may be understood in terms of the relationship between these anchorages. Simply because the judgment situation is highly ambiguous does not mean that social factors operate in an unlimited way in the modification of judgment. In this case, when the anchorage introduced by the "plant" is unusually remote from the S's scale of judgment, his judgment in the situation is determined primarily by his norm of judgment established in the first session. However, when the norm

introduced by the "plant" is immediately adjacent or very close to his own range of judgments, the S's judgments are determined both by his previous judgments and those of the "plant."

It should be pointed out however, that the present experiment was carried out in a relatively unstructured or ambiguous judgment situation. This was deliberately done since the influence of social factors on judgment is maximized under such circumstances and the present experiment deals primarily with such social influences. In a highly-structured task, as in Asch's study (1), it seems likely that the stand presented in a communication would have to be much closer to the S's stand to be effective in modifying judgment than was the case in the present experiment.

It should further be noted that in an actual communication setting, other factors aside from the stand presented may function as anchorages. Some of these factors will be referred to in the section devoted to suggestions for further research.

Suggestions for Further Research

The trend in studies of attitude change has been in the direction of investigating problems in the area from the

point of view of the basic psychological processes involved--perception, judgment, concept formation, etc. It has been suggested (7) that if investigators had concentrated their efforts on such studies from the start, the area of attitude change would be far in advance of where it is today. The present investigation was formulated in line with the trend of contemporary studies. It was believed more feasible to begin by investigating the problem using a relatively simple stimulus situation under laboratory conditions where strict controls could be adequately applied, than to attempt to utilize an actual communication setting. Because of the fact that the autokinetic situation has been previously used in the investigation of social norms, the formation of attitudes, etc., if utilized in the proper experimental design, it should provide a means for testing hypotheses concerning attitude change as well.

In terms of the psychological processes involved, the autokinetic situation as utilized in this experiment is analogous to an actual communication setting. However, as is the case with any laboratory study, until the conclusions are verified in a lifelike situation, using concrete attitudes, they must be regarded as tentative.

The first suggestion for further research in this

area therefore, is to investigate the major hypothesis presented in this study in an actual communication setting. An experiment could be designed in which factors such as source of communication, medium of communication, audience characteristics, etc., would be held constant for two groups while the factor of distance between audience attitudes and the communication was varied. It would also be desirable to test the hypothesis using different attitudes since previous research indicates the possibility that hypotheses holding true with one attitude may be invalid with another.

Since factors such as who presents the communication, the way in which it is presented, etc., operate in an actual communication setting, it would be desirable to investigate the relationship between these factors and the variable of distance, both in the laboratory using the autokinetic effect and in real-life situations as well. Thus an experiment might be designed using the autokinetic effect in which the groups were constituted in the same way as in the present experiment. With half of the Ss in each group, however, the "plant" in the situation might be a person of high prestige in their eyes, and with the other half the "plant" might be a stranger. We would predict that more shift would occur in the judgments of the Ss serving with the prestigeful "plant"

than with Ss serving with a stranger, but that comparatively the results would be the same as in the present experiment with respect to the different groups, i.e. the greater the distance between previous judgments of the Ss and those of the "plant," the smaller would be the shift in the direction of the "plant's" judgments, regardless of whether the "plant" was prestigeful or not.

Following the leads in Asch's study (2), it would be of interest to investigate the effects of increasing the group pressures on the S by increasing the number of "plants" in the autokinetic situation. If say from seven to nine "plants" served with each S, it might be anticipated that even the most remote anchorages used in the present study would be significantly more effective in modifying the S's judgments.

Summary

Fifty Caucasian, male, undergraduate students were selected from undergraduate courses in psychology at the University of North Dakota and divided into five groups of ten Ss each. Each S served in two experimental sessions separated by a 48 hour period, in which he was required to make a series of judgments regarding the extent of

autokinetic movement observed. In each case, the S served alone in the first session and made a series of 40 judgments from which a median was computed.

In the second session the Ss served under one of five different conditions. One group of Ss served as a control group and in the second session made a series of judgments under conditions identical with those in the first session. Ss in the remaining four groups served with a "plant" or confederate in the second session who was presented as simply another naive individual participating in the experiment. The "plant" in the situation made judgments which differed from those previously given by the S. The magnitude of the range used by the "plant," however, was the same as that used by each S. In other words, if the S's judgments were from two to eight inches in the initial session--a range of six inches--the "plant's" judgments in the second session also covered a range of six inches. With Ss in one experimental group, however, the range of judgments given by the "plant" extended upward from a point somewhere in the upper part of the S's range. The median of the "plant's" judgments was set one inch higher than the largest judgment previously given by the S. In a second group, the "plant's" judgments extended upward from a judgment twice as

large as the largest judgment given by the S in the first session. And in a third group, the "plant's" judgments covered a range beginning with an estimate about eight times as large as the maximum judgment previously given by the S. And with the fourth experimental group, the range began with a judgment twelve times as large as the largest judgment previously given.

The treatment of the data was made in terms of comparison of norms of judgment under the various experimental conditions. Two types of analyses were employed. The first analysis, aimed at determining shifts in central tendency between sessions, was accomplished in the following way: Change scores were computed for each S by subtracting the median of judgments in the second session from the median in the first session. If the median in the second session was smaller than the median in the first session, the change score was recorded as negative, and if the median in the second session was larger, the change score was recorded as positive. An analysis of covariance of these change scores with the Session I scores partialed out was then performed. A second analysis of the data was carried out by calculating the number of judgments in the second session falling outside the range of judgments in the first session for each S.

The results indicate that anchorages close to the S's previously established range and norm result in greater shifts in judgment than do anchorages which are more remote from the S's norm. In general, it was observed that as the discrepancy increases between the S's scale of judgment and the introduced anchorage, the effectiveness of the anchorage in producing a shift in judgment is reduced. The extent of shifts in norms was significantly greater in the group in which the smallest discrepancy existed between Ss' and "plant's" judgments. As the discrepancy increased, there was a tendency on the part of the Ss to maintain the same norm of judgment exhibited in the first session. And finally, as the discrepancy became extremely large, there was an increased tendency for some Ss to exhibit negative shifts in judgment.

Individual differences were observed among Ss participating in the experiment in the extent to which they were influenced by the "plant" in the different experimental conditions. Thus some Ss were influenced more under the extreme conditions, i.e. a great discrepancy between their judgments and those of the "plant," than were other Ss who served with the "plant" where the "plant's" judgments were not greatly different from their own.

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APPENDICES

APPENDIX I

SAMPLE QUESTIONNAIRES

NAME _____

Please answer the following questions as accurately as you can:

1. Indicate with an "X" on the line below, how sure you were of your judgments as to how far the light moved:

/_____/

VERY SURE NOT SURE AT ALL

2. What was the average distance the light moved?

_____

3. Between what limits did the light move?

From _____(Smallest Distance) to _____(Largest Distance).

(Administered to all subjects following Session I, and to Control Subjects following both sessions.)

NAME _____

Please answer the following questions as accurately as you can:

1. Indicate with an "X" on the line below, how sure you were of your judgments as to how far the light moved:

/_____/

VERY SURE NOT SURE AT ALL

2. What was the average distance the light moved?

_____

3. Between what limits did the light move?

From ____(Smallest Distance) to ____(Largest Distance).

**4. Did you feel that you were influenced by the other individual participating in the experiment?

**5. What do you think was the reason for the difference in your judgments?

(Administered to subjects in Conditions B, C, D, and E, following the second session.)

**Presented to subjects verbally--not printed on questionnaire.

APPENDIX II

RECORD OF THE JUDGMENTS OF THE CONTROL GROUP

A1 Session I	A1 Session II	A2 Session I	A2 Session II
2.00	2.00	3.00	1.50
1.00	1.50	2.50	.75
1.00	1.00	2.50	1.50
1.50	2.00	2.00	2.00
2.00	2.00	1.50	2.50
1.00	2.00	2.00	1.75
1.50	2.50	1.50	2.75
1.00	2.00	2.00	1.50
1.50	1.00	1.00	1.50
1.50	2.00	1.00	1.75
1.00	3.00	1.50	1.75
1.00	2.00	1.00	1.25
1.50	2.00	1.75	1.00
1.00	1.00	1.00	1.00
1.00	1.00	1.50	1.00
1.50	2.00	1.00	1.00
1.50	1.00	.50	1.25
1.00	1.00	1.50	.75
1.00	2.00	1.50	1.00
1.00	2.00	1.00	1.00
1.00	1.00	1.75	1.75
.50	2.00	1.50	.75
1.00	1.00	4.00	.50
1.00	1.00	1.00	1.25
1.00	2.00	1.25	.75
1.50	1.00	1.00	1.00
1.00	1.00	.75	.50
2.00	2.00	1.25	1.00
1.00	2.00	1.00	1.00
1.50	2.00	1.50	.75
1.00	1.00	1.25	.75
.50	1.00	2.00	1.00
2.00	1.00	2.00	1.50
1.00	1.00	2.50	.75
1.00	1.00	1.00	.75
1.00	1.00	1.50	1.25
1.00	1.00	1.00	1.25
1.00	1.00	2.00	.75
1.00	1.00	.75	1.00
1.50	2.00	1.25	.50

A3 Session I	A3 Session II	A4 Session I	A4 Session II
10.00	6.00	10.00	4.00
16.00	5.00	12.00	6.00
19.00	6.00	8.00	3.00
5.00	7.00	8.00	6.00
6.00	8.00	6.00	4.00
4.00	4.00	6.00	3.00
3.00	10.00	3.00	5.00
1.00	3.00	4.00	3.00
4.00	3.00	6.00	6.00
4.00	8.00	4.00	4.00
9.00	2.00	4.00	4.00
6.00	1.50	4.00	5.00
2.00	4.00	6.00	3.00
5.00	3.00	4.00	4.00
3.00	4.00	4.00	4.00
4.00	5.00	8.00	3.00
5.00	4.00	3.00	4.00
4.00	2.00	6.00	3.00
2.00	2.00	6.00	5.00
2.00	3.00	6.00	6.00
4.00	2.00	6.00	5.00
1.50	1.50	4.00	5.00
3.00	2.00	3.00	3.00
3.00	2.00	5.00	3.00
5.00	4.00	4.00	3.00
2.00	5.00	3.00	4.00
5.00	4.00	6.00	4.00
1.00	4.00	3.00	3.00
3.00	4.00	6.00	5.00
5.00	2.00	6.00	4.00
5.00	5.00	3.00	3.00
3.00	3.00	3.00	4.00
1.00	2.00	3.00	4.00
5.00	3.00	3.00	3.00
3.00	4.00	2.00	5.00
2.00	6.00	2.00	5.00
7.00	6.00	3.00	3.00
6.00	6.00	5.00	3.00
2.00	7.00	3.00	4.00
2.00	6.00	5.00	5.00

A5 Session I	A5 Session II	A6 Session I	A6 Session II
3.00	5.00	4.00	4.00
3.00	7.00	3.00	6.00
4.00	6.00	5.00	5.00
7.00	7.00	4.00	7.00
3.00	7.00	6.00	5.00
2.00	6.00	4.00	3.00
4.00	5.00	5.00	6.00
3.00	5.00	8.00	4.00
6.00	7.00	4.00	3.00
8.00	4.00	5.00	5.00
8.00	8.00	6.00	4.00
7.00	5.00	3.00	5.00
5.00	4.00	5.00	4.00
4.00	6.00	7.00	3.00
4.00	4.00	3.00	3.00
5.00	3.00	4.00	5.00
3.00	5.00	4.00	5.00
5.00	4.00	8.00	3.00
5.00	4.00	4.00	4.00
5.00	5.00	7.00	4.00
5.00	9.00	5.00	5.00
6.00	5.00	3.00	6.00
5.00	6.00	6.00	7.00
4.00	5.00	5.00	7.00
5.00	4.00	4.00	4.00
4.00	6.00	9.00	5.00
6.00	5.00	7.00	8.00
3.00	6.00	6.00	7.00
4.00	4.00	7.00	7.00
5.00	5.00	3.00	8.00
4.00	4.00	5.00	4.00
4.00	7.00	4.00	5.00
6.00	5.00	6.00	6.00
4.00	5.00	8.00	3.00
3.00	4.00	6.00	4.00
5.00	6.00	7.00	6.00
4.00	8.00	8.00	4.00
3.00	6.00	4.00	7.00
5.00	4.00	6.00	6.00
4.00	5.00	7.00	7.00

A7 Session I	A7 Session II	A8 Session I	A8 Session II
10.00	8.00	10.00	6.00
8.00	7.00	4.00	6.00
10.00	7.00	6.00	6.00
8.00	7.00	4.00	8.00
5.00	6.00	5.00	7.00
7.00	6.00	4.00	8.00
4.50	6.00	6.00	8.00
7.00	5.00	4.00	5.00
5.00	4.00	6.00	14.00
5.00	4.00	4.00	10.00
7.00	4.00	6.00	6.00
5.00	5.00	5.00	14.00
5.00	5.00	2.00	6.00
5.00	4.00	4.00	6.00
6.00	5.00	3.00	4.00
6.00	5.00	4.00	12.00
4.50	5.50	1.00	4.00
5.00	6.50	6.00	8.00
8.00	6.00	5.00	10.00
7.00	5.00	7.00	10.00
7.00	5.00	6.00	6.00
7.00	6.00	6.00	6.00
6.00	6.00	6.00	8.00
6.00	6.50	8.00	12.00
6.00	7.00	14.00	14.00
6.00	6.00	6.00	12.00
6.00	6.00	10.00	4.00
6.00	6.00	24.00	14.00
6.00	5.50	10.00	16.00
6.00	6.00	24.00	12.00
7.00	6.00	8.00	10.00
6.00	7.00	8.00	10.00
6.00	5.00	18.00	4.00
5.00	6.00	12.00	8.00
6.00	5.00	18.00	2.00
7.00	5.00	10.00	4.00
5.00	5.00	8.00	8.00
6.00	5.00	24.00	3.00
8.00	4.00	12.00	14.00
7.00	5.00	8.00	6.00

A9 Session I	A9 Session II	A10 Session I	A10 Session II
12.00	12.00	36.00	20.00
24.00	12.00	24.00	24.00
18.00	12.00	36.00	30.00
24.00	12.00	24.00	36.00
18.00	15.00	30.00	32.00
30.00	12.00	12.00	28.00
24.00	10.00	30.00	34.00
18.00	14.00	24.00	26.00
18.00	12.00	20.00	30.00
18.00	12.00	12.00	32.00
24.00	6.00	18.00	36.00
24.00	10.00	20.00	28.00
18.00	6.00	30.00	38.00
15.00	12.00	20.00	34.00
18.00	15.00	24.00	28.00
24.00	12.00	28.00	34.00
10.00	6.00	30.00	38.00
14.00	12.00	15.00	30.00
12.00	15.00	20.00	32.00
24.00	15.00	24.00	38.00
30.00	12.00	30.00	24.00
6.00	12.00	30.00	28.00
15.00	15.00	36.00	30.00
12.00	10.00	24.00	34.00
18.00	20.00	30.00	26.00
4.00	6.00	40.00	28.00
24.00	15.00	30.00	36.00
12.00	12.00	36.00	38.00
12.00	15.00	28.00	34.00
15.00	15.00	42.00	32.00
6.00	12.00	36.00	28.00
18.00	10.00	38.00	30.00
18.00	6.00	32.00	38.00
12.00	15.00	38.00	32.00
18.00	12.00	30.00	34.00
24.00	12.00	36.00	32.00
6.00	6.00	28.00	34.00
18.00	14.00	34.00	28.00
15.00	12.00	38.00	36.00
4.00	12.00	32.00	28.00

APPENDIX III

RECORD OF THE JUDGMENTS OF THE EXPERIMENTAL GROUPS

B1 Session I	B1 Session II	B2 Session I	B2 Session II
1.25	2.33	.25	2.00
1.00	1.75	.50	2.50
1.25	1.50	.50	3.00
1.33	1.25	.50	3.50
1.50	2.00	1.00	3.00
1.33	1.25	1.00	4.50
1.25	2.50	1.00	3.50
2.00	1.00	1.25	3.50
1.66	3.50	1.00	2.50
1.50	1.50	1.00	5.00
1.50	3.00	1.25	3.50
1.00	2.00	1.25	4.00
1.00	2.75	2.00	4.50
1.12	3.00	.75	5.00
.66	2.50	2.00	4.50
1.00	2.25	3.50	4.00
1.00	2.50	3.50	5.50
1.50	1.66	1.50	4.50
1.25	1.00	2.50	3.50
1.33	2.50	.50	2.00
1.50	3.00	1.00	4.50
1.25	2.50	1.25	3.00
.66	3.00	2.50	4.00
1.00	2.50	1.50	4.00
1.25	3.00	2.50	5.00
1.00	3.00	1.50	3.00
1.33	2.50	2.00	5.50
1.00	2.00	1.00	3.00
.66	3.00	2.50	2.50
1.25	2.00	2.50	3.50
1.25	5.00	3.00	3.00
1.25	6.50	2.00	3.00
1.00	3.00	2.50	3.50
1.50	2.00	3.50	4.00
1.33	3.00	1.50	3.00
1.25	3.25	1.50	4.00
1.00	3.00	1.50	4.00
1.00	2.00	2.50	4.00
1.00	3.50	3.00	3.50
2.00	5.00	2.50	3.00

B3 Session I	B3 Session II	B4 Session I	B4 Session II
4.00	6.00	4.00	8.00
3.00	6.00	7.00	6.00
6.00	8.00	5.00	9.00
3.00	4.00	5.00	5.00
3.00	4.00	4.00	9.00
5.00	5.00	4.00	6.00
3.00	4.00	8.00	7.00
3.00	6.00	6.00	6.00
3.00	7.00	3.00	6.00
3.00	4.00	4.00	10.00
2.00	3.00	4.00	12.00
4.00	5.00	3.00	7.00
4.00	7.00	3.00	8.00
5.00	4.00	3.00	7.00
5.00	5.00	2.00	7.00
4.00	6.00	3.00	6.00
4.00	5.00	1.00	5.00
4.00	6.00	3.00	7.00
4.00	3.00	2.00	11.00
6.00	5.00	2.00	6.00
4.00	7.00	4.00	9.00
3.00	5.00	5.00	5.00
3.00	4.00	1.50	6.00
4.00	4.00	4.00	7.00
3.00	3.00	4.00	12.00
4.00	5.00	5.00	5.00
4.00	6.00	6.00	8.00
3.00	5.00	7.00	4.00
6.00	5.00	5.00	7.00
6.00	4.00	5.00	4.00
6.00	7.00	5.00	6.00
6.00	4.00	4.00	5.00
4.00	7.00	4.00	7.00
4.00	4.00	3.00	6.00
4.00	6.00	3.00	5.00
4.00	5.00	5.00	4.00
4.00	6.00	5.00	6.00
4.00	3.00	4.00	6.00
3.00	6.00	4.00	5.00
3.00	5.00	5.00	6.00

B5 Session I	B5 Session II	B6 Session I	B6 Session II
3.00	3.50	3.00	5.00
5.00	5.00	5.00	12.00
2.00	9.00	5.00	8.00
3.00	12.00	4.00	10.00
5.00	11.00	4.00	6.00
1.00	12.00	3.00	9.00
1.50	8.00	5.00	7.00
2.00	12.00	5.00	7.00
4.00	10.00	6.00	10.00
1.00	9.00	6.00	5.00
1.50	5.00	5.00	6.00
2.50	11.00	4.00	6.00
1.50	12.00	7.00	7.00
2.00	8.00	4.00	7.00
6.00	10.00	6.00	9.00
7.00	13.00	5.00	6.00
6.00	13.00	7.00	7.00
5.00	16.00	5.00	7.00
7.00	15.00	6.00	8.00
7.00	10.00	7.00	8.00
5.00	14.00	4.00	9.00
3.00	15.00	7.00	8.00
8.00	12.00	7.00	8.00
5.00	9.00	4.00	8.00
2.00	13.00	6.00	7.00
7.00	11.00	5.00	8.00
3.00	13.00	5.00	9.00
4.00	9.00	5.00	7.00
5.00	13.00	7.00	9.00
4.50	14.00	7.00	7.00
8.00	13.00	6.00	9.00
10.00	10.00	5.00	8.00
6.00	15.00	5.00	7.00
6.00	9.00	7.00	7.00
4.00	1.00	4.00	8.00
10.00	9.00	6.00	8.00
3.00	14.00	5.00	9.00
3.00	10.00	6.00	7.00
5.00	14.00	4.00	8.00
4.00	13.00	6.00	7.00

B7 Session I	B7 Session II	B8 Session I	B8 Session II
1.50	3.00	2.00	6.00
2.00	6.00	12.00	8.00
3.00	8.00	6.00	4.00
4.50	9.00	18.00	10.00
3.00	10.00	9.00	10.00
2.00	6.00	4.00	12.00
7.00	10.00	12.00	6.00
8.00	12.00	12.00	13.00
9.00	10.00	18.00	12.00
12.00	10.00	12.00	15.00
14.00	13.00	6.00	10.00
15.00	12.00	1.00	6.00
10.00	10.00	12.00	10.00
14.00	14.00	9.00	14.00
16.00	8.00	12.00	8.00
8.00	11.00	18.00	15.00
13.00	11.00	12.00	10.00
15.00	16.00	12.00	15.00
15.00	10.00	8.00	16.00
10.00	15.00	4.00	15.00
12.00	12.00	13.00	12.00
6.00	17.00	15.00	10.00
10.00	9.00	11.00	11.00
12.00	9.00	8.00	15.00
14.00	12.00	14.00	13.00
8.00	16.00	4.00	16.00
9.00	15.00	10.00	14.00
6.00	8.00	15.00	17.00
4.00	12.00	16.00	12.00
7.00	13.00	15.00	13.00
4.00	18.00	12.00	15.00
6.00	4.00	8.00	17.00
9.00	15.00	3.00	10.00
10.00	10.00	6.00	16.00
12.00	9.00	8.00	13.00
3.00	13.00	6.00	15.00
8.00	6.00	4.00	16.00
5.00	8.00	8.00	18.00
6.00	10.00	4.00	10.00
3.00	12.00	9.00	14.00

B9 Session I	B9 Session II	B10 Session I	B10 Session II
24.00	12.00	6.00	18.00
36.00	15.00	12.00	12.00
24.00	15.00	24.00	3.00
12.00	25.00	24.00	6.00
18.00	35.00	18.00	12.00
6.00	15.00	6.00	24.00
6.00	20.00	2.00	24.00
12.00	25.00	18.00	36.00
12.00	20.00	24.00	8.00
18.00	20.00	6.00	12.00
12.00	15.00	12.00	12.00
6.00	35.00	3.00	6.00
6.00	10.00	3.00	24.00
12.00	15.00	12.00	30.00
18.00	25.00	12.00	6.00
12.00	30.00	6.00	12.00
36.00	10.00	6.00	6.00
6.00	30.00	12.00	12.00
12.00	20.00	18.00	24.00
12.00	15.00	12.00	18.00
12.00	25.00	12.00	6.00
12.00	30.00	12.00	3.00
16.00	25.00	24.00	36.00
20.00	20.00	12.00	24.00
5.00	25.00	18.00	18.00
12.00	35.00	6.00	24.00
3.00	25.00	3.00	30.00
2.00	35.00	18.00	18.00
6.00	25.00	12.00	36.00
8.00	30.00	18.00	6.00
6.00	35.00	6.00	24.00
12.00	30.00	12.00	18.00
18.00	25.00	24.00	24.00
8.00	25.00	18.00	12.00
12.00	30.00	12.00	24.00
6.00	20.00	3.00	18.00
12.00	30.00	6.00	18.00
24.00	30.00	12.00	12.00
10.00	25.00	6.00	12.00
5.00	30.00	12.00	18.00

C1 Session I	C1 Session II	C2 Session I	C2 Session II
1.00	1.00	1.00	.37
.75	1.50	.25	.75
.25	3.00	.25	.62
.50	2.00	.37	1.25
.50	2.00	.25	1.00
.25	3.00	.37	1.75
.25	2.00	.12	2.00
.25	3.00	.75	2.50
.50	3.00	.50	1.75
.25	3.50	.12	1.62
.50	2.00	.25	2.25
1.00	3.50	.75	2.00
.50	2.50	1.00	1.75
.50	3.25	.87	2.00
.25	2.50	.75	1.37
.25	3.00	1.00	3.50
.50	3.00	.50	3.62
.25	3.25	.75	3.00
1.00	3.00	.62	2.12
.50	3.00	1.25	3.25
1.00	2.00	1.50	2.62
1.00	3.00	1.06	1.75
1.00	3.00	1.00	3.25
1.00	3.00	.87	2.00
.50	3.25	.87	3.00
1.00	3.00	.62	2.75
1.00	2.00	1.25	3.25
.75	3.00	.50	4.00
.50	2.75	.75	1.37
.75	3.50	.62	1.75
1.50	3.00	1.25	2.12
.50	3.50	.50	1.00
1.00	3.00	1.75	2.25
.25	3.25	.62	1.87
.25	3.25	1.25	.75
.25	3.00	.37	3.00
.50	3.00	.50	2.75
1.00	3.75	1.00	3.50
.25	3.25	1.50	2.50
.75	3.00	2.00	3.12

C3 Session I	C3 Session II	C4 Session I	C4 Session II
.75	1.50	1.00	1.50
.50	2.00	1.00	.50
.50	1.50	1.25	.25
.75	2.00	.50	1.50
.50	2.00	1.00	2.50
.75	1.75	.50	2.00
1.00	2.50	.25	3.00
1.00	1.50	1.25	4.00
.75	2.00	.50	5.00
.75	2.50	1.00	3.00
.75	2.50	1.25	1.00
1.00	1.50	.50	.50
.50	2.50	.50	2.50
1.00	2.50	1.25	6.50
1.00	1.00	1.25	5.00
.50	2.00	1.50	6.00
1.50	2.75	1.25	4.00
1.00	1.50	2.50	5.00
1.00	2.00	1.00	7.00
1.50	2.00	1.50	5.00
1.50	2.50	1.50	6.00
.25	2.50	2.00	6.50
.75	2.00	1.00	3.00
1.50	2.00	1.00	5.00
1.50	1.50	2.00	6.00
.75	2.50	1.00	3.00
.25	1.00	.75	4.00
.75	2.50	.75	5.00
.75	2.00	.25	1.50
1.50	1.50	2.50	4.00
1.00	2.00	1.50	6.00
1.25	2.00	1.50	3.00
.75	2.50	1.50	6.00
1.00	2.00	2.00	5.50
1.50	2.50	1.00	.50
1.50	2.00	2.00	2.00
.75	1.00	1.50	1.00
2.00	2.50	2.00	5.00
1.50	2.50	1.50	12.00
1.50	2.50	1.75	.50

C5 Session I	C5 Session II	C6 Session I	C6 Session II
3.00	3.00	4.00	3.00
3.00	2.00	5.00	2.00
1.00	2.00	2.00	5.00
1.00	3.00	6.00	6.00
2.00	4.00	5.00	7.00
2.00	2.00	4.00	6.00
3.00	4.00	3.00	3.00
2.00	1.00	2.00	10.00
4.00	3.00	4.00	8.00
4.00	3.00	5.00	2.00
3.00	2.00	2.00	6.00
4.00	3.00	2.00	9.00
5.00	4.00	3.00	4.00
4.00	4.00	1.00	12.00
2.00	5.00	4.00	13.00
5.00	4.00	3.00	9.00
4.00	4.00	2.00	8.00
4.00	3.00	7.00	7.00
3.00	4.00	3.00	12.00
2.00	4.00	3.00	11.00
3.00	3.00	4.00	4.00
4.00	5.00	3.00	10.00
1.00	2.00	1.50	6.00
4.00	3.00	4.00	4.00
3.00	3.00	1.00	6.00
3.00	1.00	8.00	5.00
4.00	3.00	5.00	3.00
2.00	3.00	4.00	6.00
2.00	4.00	3.00	8.00
2.00	2.00	4.00	12.00
3.00	4.00	3.00	13.00
3.00	2.00	2.00	8.00
4.00	5.00	4.00	7.00
2.00	2.00	5.00	9.00
3.00	3.00	4.00	6.00
3.00	4.00	6.00	7.00
2.00	4.00	4.00	8.00
3.00	4.00	3.00	6.00
4.00	4.00	2.00	10.00
2.00	2.00	4.00	4.00

C7 Session I	C7 Session II	C8 Session I	C8 Session II
3.50	2.50	.25	4.00
2.00	4.50	1.25	6.00
4.00	8.00	1.00	12.00
2.00	5.00	1.50	12.00
5.00	4.50	1.50	12.00
3.50	6.00	1.00	15.00
4.50	3.00	1.25	12.00
6.00	6.50	1.00	12.00
2.50	3.50	1.50	15.00
6.50	7.00	2.50	10.00
3.00	6.00	1.50	12.00
2.00	7.50	3.00	12.00
1.50	5.00	2.50	15.00
4.50	9.00	1.50	12.00
2.00	5.00	2.50	12.00
3.50	6.00	3.00	10.00
1.50	6.50	1.00	20.00
3.00	7.00	2.50	15.00
4.00	6.00	2.50	15.00
3.00	6.50	5.00	10.00
2.50	5.00	5.00	12.00
2.50	7.00	5.00	10.00
8.00	9.50	5.00	24.00
9.00	6.50	5.00	20.00
4.50	9.50	8.00	20.00
5.00	5.00	5.00	24.00
3.50	5.50	5.00	25.00
3.00	6.00	4.00	8.00
4.00	7.50	5.00	24.00
7.50	8.00	6.00	12.00
4.00	4.50	10.00	15.00
7.00	5.50	8.00	15.00
3.00	7.00	8.00	24.00
5.00	7.00	10.00	24.00
4.00	10.50	13.00	26.00
5.00	6.50	8.00	10.00
2.00	5.50	15.00	15.00
4.50	7.50	10.00	12.00
3.50	6.00	15.00	15.00
6.00	6.50	10.00	15.00

C9 Session I	C9 Session II	C10 Session I	C10 Session II
8.50	5.00	8.00	14.00
8.00	8.00	10.00	16.00
10.00	8.00	12.00	16.00
10.00	10.00	12.00	16.00
12.00	11.00	8.00	16.00
13.00	9.00	12.00	16.00
13.00	12.00	18.00	18.00
14.00	8.00	14.00	18.00
13.00	12.00	18.00	18.00
15.00	12.00	10.00	16.00
12.00	13.00	18.00	18.00
15.00	12.00	12.00	18.00
13.00	14.00	10.00	18.00
13.00	10.00	18.00	16.00
14.00	13.00	14.00	18.00
14.00	12.00	12.00	10.00
12.00	12.00	14.00	14.00
13.00	15.00	10.00	20.00
10.00	15.00	10.00	18.00
14.00	12.00	12.00	18.00
13.00	15.00	10.00	21.00
10.00	13.00	14.00	18.00
11.00	13.00	12.00	16.00
8.00	14.00	14.00	22.00
10.00	13.00	8.00	20.00
11.00	18.00	4.00	24.00
8.00	11.00	8.00	26.00
10.00	12.00	4.00	28.00
9.00	14.00	14.00	24.00
11.00	11.00	14.00	20.00
13.00	7.00	8.00	22.00
9.00	16.00	8.00	16.00
6.00	15.00	12.00	24.00
6.00	13.00	14.00	18.00
8.00	11.00	12.00	20.00
10.00	9.00	10.00	20.00
8.00	14.00	12.00	24.00
9.00	10.00	8.00	24.00
11.00	9.00	10.00	22.00
8.00	12.00	14.00	24.00

D1 Session I	D1 Session II	D2 Session I	D2 Session II
1.50	1.00	1.00	1.25
.50	2.00	.50	6.00
2.00	1.50	.25	1.50
1.00	1.25	3.00	3.00
1.00	1.00	1.25	.62
.50	1.50	5.00	4.00
1.00	2.00	3.00	5.00
.25	.75	4.00	1.00
.12	2.00	1.00	3.00
1.50	1.00	1.50	8.00
.50	1.25	1.50	5.00
2.50	1.00	2.00	9.00
.50	.50	2.00	6.00
.25	1.50	1.00	1.00
.75	.75	1.50	2.00
1.00	2.00	.50	1.00
2.50	1.25	.12	.75
1.00	1.00	.75	4.00
.25	2.00	.50	5.00
.50	1.25	.25	11.00
1.00	1.50	2.50	4.00
1.00	1.75	2.50	7.00
.25	.50	2.50	5.00
1.00	.25	1.50	1.00
1.50	1.00	.25	1.50
.50	.50	.25	1.00
1.00	1.25	.25	2.00
.50	1.50	.25	.25
.25	1.00	.75	2.00
1.00	.75	1.00	3.00
1.25	.75	.12	1.50
2.00	.50	1.00	5.00
1.00	1.00	.50	.75
.75	1.75	1.50	.75
1.50	1.50	1.75	5.00
.25	1.50	1.00	7.00
1.00	1.25	.50	5.00
.12	.75	.75	8.00
1.25	1.25	.50	6.00
.50	2.00	1.00	13.00

D3 Session I	D3 Session II	D4 Session I	D4 Session II
3.00	4.00	8.00	3.00
3.00	6.00	6.00	9.00
3.00	8.00	8.00	6.00
2.00	14.00	8.00	11.00
1.00	5.00	11.00	9.00
3.00	4.00	7.00	12.00
5.00	3.00	10.00	8.00
5.00	14.00	7.00	8.00
3.00	5.00	9.00	9.00
1.00	7.00	12.00	8.00
4.00	8.00	7.00	9.00
3.00	2.00	9.00	8.00
5.00	12.00	8.00	7.00
3.00	1.00	11.00	11.00
2.00	4.00	12.00	8.00
4.00	1.00	9.00	9.00
3.00	4.00	11.00	11.00
3.00	7.00	10.00	8.00
3.00	7.00	8.00	9.00
1.00	9.00	9.00	9.00
4.00	4.00	8.00	8.00
3.00	3.00	9.00	10.00
2.00	4.00	7.00	7.00
2.00	4.00	9.00	10.00
4.00	4.00	8.00	9.00
3.00	3.00	8.00	11.00
4.00	6.00	7.00	8.00
2.00	10.00	7.00	9.00
3.00	5.00	7.00	7.00
1.00	8.00	7.00	8.00
3.00	3.00	7.00	7.00
2.00	3.00	9.00	10.00
3.00	6.00	8.00	8.00
2.00	4.00	7.00	9.00
2.00	10.00	7.00	8.00
3.00	3.00	9.00	9.00
2.00	2.00	9.00	8.00
3.00	2.00	7.00	8.00
1.00	3.00	9.00	8.00
3.00	1.00	8.00	10.00

D5 Session I	D5 Session II	D6 Session I	D6 Session II
15.00	12.50	12.00	12.00
13.00	13.00	12.00	14.00
10.00	15.00	11.00	12.00
5.50	17.00	10.00	12.00
9.00	14.50	12.00	12.00
1.50	20.00	11.00	12.00
14.00	13.50	12.00	12.00
9.00	16.00	12.00	12.00
9.00	13.00	13.00	12.00
11.00	18.00	11.00	12.50
8.00	17.50	12.00	12.00
2.00	20.00	12.00	12.00
8.00	17.50	13.00	11.00
12.00	22.00	12.00	13.00
7.00	14.00	13.00	12.00
11.00	19.00	12.00	12.00
15.00	20.00	13.00	12.00
9.50	18.00	11.00	12.00
13.00	14.00	10.00	12.00
11.00	20.00	13.00	16.00
14.00	17.00	12.00	12.50
7.00	18.00	12.00	12.00
13.00	14.50	11.00	12.50
12.00	15.00	11.00	13.00
10.50	14.00	11.00	13.00
11.50	14.00	11.00	13.00
13.00	16.50	11.00	13.00
10.50	14.00	11.00	12.00
13.00	14.00	11.00	16.00
11.00	15.00	11.00	14.00
7.00	14.00	11.00	12.00
14.50	20.00	11.00	13.00
9.50	15.00	11.00	12.00
10.00	15.00	11.00	13.00
14.50	15.00	10.00	12.00
14.00	18.00	11.00	12.00
10.00	14.00	11.00	12.00
12.00	18.00	11.00	12.50
8.00	14.00	11.00	12.00
18.00	14.00	10.00	13.00

D7 Session I	D7 Session II	D8 Session I	D8 Session II
2.00	3.00	3.00	8.00
4.00	8.00	3.00	12.00
9.00	5.00	4.00	14.00
6.00	12.00	5.00	15.00
5.00	15.00	6.00	12.00
6.00	8.00	6.00	16.00
12.00	6.00	8.00	12.00
24.00	20.00	12.00	13.00
24.00	14.00	8.00	10.00
18.00	24.00	12.00	14.00
18.00	10.00	6.00	10.00
24.00	24.00	12.00	16.00
8.00	10.00	12.00	15.00
12.00	16.00	14.00	15.00
10.00	12.00	12.00	10.00
20.00	9.00	14.00	12.00
8.00	15.00	8.00	13.00
10.00	18.00	12.00	14.00
12.00	6.00	15.00	10.00
12.00	9.00	10.00	13.00
15.00	18.00	12.00	8.00
5.00	17.00	12.00	15.00
13.00	5.00	10.00	13.00
5.00	13.00	14.00	13.00
16.00	24.00	15.00	10.00
24.00	9.00	15.00	8.00
12.00	12.00	13.00	12.00
18.00	14.00	13.00	10.00
15.00	11.00	12.00	12.00
24.00	18.00	13.00	12.00
10.00	17.00	8.00	8.00
8.00	11.00	15.00	13.00
14.00	9.00	12.00	12.00
24.00	9.00	12.00	12.00
9.00	11.00	13.00	8.00
18.00	5.00	14.00	14.00
8.00	10.00	14.00	10.00
5.00	9.00	15.00	12.00
12.00	8.00	12.00	13.00
8.00	4.00	15.00	16.00

D9 Session I	D9 Session II	D10 Session I	D10 Session II
8.00	14.00	18.00	12.00
14.00	9.00	24.00	16.00
15.00	14.00	18.00	12.00
14.00	14.00	18.00	18.00
12.00	16.00	24.00	24.00
16.00	20.00	12.00	18.00
20.00	12.00	12.00	18.00
15.00	14.00	12.00	15.00
7.00	12.00	18.00	15.00
17.00	20.00	12.00	18.00
14.00	10.00	12.00	18.00
14.00	21.00	15.00	18.00
22.00	12.00	18.00	18.00
20.00	10.00	18.00	15.00
15.00	20.00	24.00	24.00
18.00	20.00	24.00	12.00
24.00	9.00	12.00	15.00
18.00	11.00	18.00	18.00
20.00	9.00	18.00	15.00
24.00	20.00	20.00	12.00
18.00	10.00	12.00	15.00
16.00	13.00	12.00	10.00
13.00	15.00	12.00	10.00
13.00	21.00	15.00	24.00
16.00	24.00	12.00	12.00
13.00	21.00	18.00	10.00
10.00	11.00	12.00	10.00
16.00	16.00	24.00	18.00
16.00	10.00	18.00	18.00
20.00	11.00	18.00	15.00
16.00	11.00	24.00	15.00
13.00	8.00	18.00	15.00
20.00	16.00	12.00	15.00
13.00	25.00	12.00	12.00
10.00	14.00	18.00	24.00
26.00	21.00	24.00	12.00
20.00	9.00	12.00	15.00
16.00	25.00	8.00	24.00
14.00	9.00	12.00	15.00
21.00	14.00	12.00	12.00

E1 Session I	E1 Session II	E2 Session I	E2 Session II
2.00	1.00	1.000	.500
1.00	1.50	1.062	2.000
.25	1.50	.500	1.000
.12	2.00	1.000	2.500
.12	1.00	.500	1.500
.25	2.00	1.062	1.250
.25	1.00	1.225	.500
.12	1.50	1.000	1.000
.25	1.00	.625	2.000
.12	.50	.333	1.250
.12	1.50	.187	1.000
.12	.75	.125	.750
.25	1.00	.062	2.000
,25	1.00	.125	.750
.12	.75	.187	.500
.06	1.00	.250	.500
.06	1.50	.312	.750
.06	1.75	.125	1.000
.12	1.00	.187	.750
.25	.75	.250	.500
1.00	.75	.500	1.500
.06	1.50	.750	.750
.12	1.00	.750	1.000
.25	1.50	1.250	1.000
.06	.75	.500	1.250
.06	.75	.062	.750
.12	.50	.087	.750
.50	.50	.500	1.000
.12	.75	.062	1.000
.06	2.00	.187	.500
.06	1.00	.125	.750
.06	2.00	.062	.500
.12	1.00	.062	.250
.12	2.00	.062	.250
.50	.50	.062	1.000
.12	.50	.125	.500
.50	1.00	.250	1.000
.12	1.00	.500	.250
.06	.50	.187	.750
.25	.75	.125	.250

E3 Session I	E3 Session II	E4 Session I	E4 Session II
.50	1.00	2.00	1.00
.50	.25	2.00	3.00
1.00	.50	1.00	2.00
.25	1.00	2.00	2.00
1.00	1.25	3.00	2.00
.25	.50	2.00	3.00
.25	.50	2.00	2.00
.25	.25	1.00	3.00
.50	1.00	1.00	3.00
.25	1.00	2.00	3.00
.25	.25	1.00	1.00
1.00	1.00	1.00	3.00
.50	1.25	2.00	3.00
1.00	.25	1.00	3.00
.25	.75	2.00	3.00
1.25	1.25	1.00	2.00
.50	1.00	2.00	3.00
1.00	.25	1.00	3.00
1.00	1.00	2.00	3.00
1.00	.25	1.00	3.00
.50	.75	2.00	2.00
.25	1.50	1.00	3.00
.50	.75	1.00	3.00
1.00	.50	2.00	3.00
.25	.25	3.00	3.00
1.00	1.00	3.00	2.00
.25	1.25	2.00	2.00
1.50	.25	3.00	2.00
.25	1.00	2.00	3.00
.50	1.00	1.00	3.00
.25	1.00	2.00	3.00
.50	.75	1.00	3.00
1.00	.75	1.00	2.50
1.00	1.00	3.00	3.00
1.00	.25	2.00	3.00
1.00	.50	1.00	3.50
.50	.50	1.00	2.00
.25	1.00	1.00	3.00
.50	.50	1.00	3.00
1.00	.50	1.00	3.00

E5 Session I	E5 Session II	E6 Session I	E6 Session II
3.00	4.00	6.00	8.00
3.00	2.00	5.00	5.00
2.00	3.00	4.00	6.00
1.00	4.00	3.00	8.00
3.00	3.00	8.00	7.00
2.00	4.00	3.00	6.00
2.00	3.00	6.00	4.00
3.00	3.00	10.00	5.00
4.00	4.00	12.00	5.00
2.00	3.00	3.00	5.00
4.00	4.00	3.00	8.00
2.00	4.00	6.00	5.00
2.00	2.00	3.00	6.00
1.00	3.00	2.00	8.00
3.00	3.00	7.00	6.00
1.00	3.00	12.00	2.00
2.00	2.00	8.00	8.00
2.00	3.00	6.00	6.00
1.00	2.00	5.00	6.00
2.00	2.00	2.00	4.00
2.00	4.00	6.00	6.00
1.00	3.00	6.00	12.00
2.00	2.00	12.00	6.00
3.00	3.00	3.00	14.00
1.00	3.00	12.00	4.00
4.00	2.00	7.00	4.00
2.00	3.00	5.00	14.00
2.00	2.00	7.00	6.00
1.00	4.00	5.00	6.00
2.00	2.00	2.00	8.00
1.00	3.00	3.00	6.00
2.00	3.00	12.00	4.00
2.00	2.00	6.00	12.00
1.00	2.00	8.00	5.00
2.00	3.00	14.00	6.00
1.00	3.00	12.00	12.00
2.00	3.00	10.00	3.00
2.00	2.00	5.00	6.00
3.00	2.00	6.00	6.00
1.00	2.00	6.00	8.00

E7 Session I	E7 Session II	E8 Session I	E8 Session II
10.00	6.00	4.00	8.00
10.00	10.00	5.00	10.00
6.00	6.00	5.00	12.00
7.00	8.00	8.00	12.00
6.00	6.00	10.00	10.00
6.00	12.00	10.00	12.00
8.00	6.00	10.00	10.00
6.00	6.00	12.00	12.00
6.00	6.00	12.00	10.00
6.00	5.00	12.00	12.00
8.00	8.00	10.00	11.00
6.00	12.00	12.00	13.00
8.00	10.00	12.00	10.00
6.00	8.00	12.00	12.00
6.00	10.00	10.00	11.00
6.00	10.00	12.00	13.00
4.00	6.00	12.00	13.00
7.00	8.00	12.00	14.00
6.00	8.00	12.00	12.00
4.00	12.00	10.00	13.00
4.00	6.00	12.00	12.00
6.00	13.00	10.00	13.00
8.00	6.00	12.00	11.00
8.00	6.00	12.00	10.00
6.00	6.00	10.00	11.00
8.00	6.00	10.00	12.00
8.00	6.00	10.00	10.00
6.00	10.00	8.00	12.00
8.00	4.00	10.00	10.00
8.00	6.00	10.00	12.00
8.00	6.00	12.00	11.00
6.00	8.00	10.00	10.00
6.00	6.00	8.00	11.00
6.00	6.00	10.00	10.00
6.00	7.00	12.00	12.00
10.00	6.00	10.00	10.00
10.00	6.00	10.00	11.00
10.00	7.00	12.00	12.00
8.00	8.00	8.00	12.00
6.00	8.00	10.00	12.00

E9 Session I	E9 Session II	E10 Session I	E10 Session II
12.00	10.00	4.50	12.00
18.00	8.00	12.00	18.50
12.00	5.00	16.75	17.00
20.00	4.00	11.50	22.50
30.00	3.50	18.00	19.50
26.00	4.00	24.00	23.50
20.00	4.00	21.00	22.00
14.00	4.00	18.00	26.00
26.00	4.25	18.00	21.00
30.00	4.00	15.50	27.00
16.00	4.50	19.00	18.00
12.00	5.00	18.00	19.00
10.00	4.50	14.00	18.00
12.00	5.00	16.50	23.00
10.00	6.00	14.50	16.00
10.00	5.50	17.00	18.00
8.00	6.00	15.00	18.00
14.00	4.00	15.00	19.00
15.00	3.50	11.50	17.00
18.00	4.00	13.00	18.00
8.00	4.00	12.50	22.00
16.00	3.50	16.00	21.00
10.00	3.50	16.00	20.00
12.00	3.50	14.00	19.00
12.00	3.00	17.00	18.00
14.00	4.00	18.00	19.00
10.00	2.50	14.00	26.00
16.00	3.00	13.00	16.00
11.00	5.00	14.50	19.00
10.00	5.00	14.00	21.00
8.00	3.50	17.00	14.00
10.00	4.00	12.00	19.00
10.00	4.00	13.00	16.00
8.00	4.00	11.00	16.00
12.00	4.00	11.00	17.00
10.00	3.50	12.00	17.00
8.00	3.50	14.00	17.00
12.00	4.00	15.00	18.00
12.00	3.00	13.00	19.00
8.00	3.50	16.00	19.00